Physical Inspection Sub-System

Report to Conferees:
REAC Physical Inspection
Process Study and Results

March 1, 2001

US Department of Housing and Urban Development
Real Estate Assessment Center

Executive Summary

In the Conference Report on H.R. 4635[1], the conferees requested that the Department of Housing and Urban Development (HUD) conduct a statistically valid test of the Public Housing Assessment System (PHAS) physical inspection program. Accordingly, HUD's Real Estate Assessment Center (REAC) completed a study to characterize and quantify the repeatability and consistency of the physical inspection protocol. The study shows that the inspection process does provide reasonably accurate, repeatable, objective, and fair results.

ES1 - Study Approach

In response to the conferees, REAC developed a two-phased technical approach for data collection, analysis, and reporting of the study's findings to meet the following two objectives:

1. Complete the statistically valid study per the Conference Report, and
2. Establish a current performance benchmark in a continually improving process.

A summary of the two-phased technical approach is described below:

Phase I – Phase I was designed to be a reference point for the current contractor inspector pool in relation to the performance benchmarks established in Phase II of this study. REAC targeted recently performed contract inspections at 56 properties for a follow up review and inspection. During this phase, REAC inspectors performed parallel inspections of the properties previously inspected by contract personnel. Comparison of results between the two inspections enabled REAC to evaluate the repeatability and consistency of the REAC protocol. This approach provided for a reasonable audit of the REAC protocol because the properties included were similar to the public housing property inventory with respect to size and physical inspection scores.

Phase II – This phase represented the statistically valid study stipulated by the conferees. Phase II also established the current performance benchmark in a continually improving process. REAC designed a two-stage random sampling scheme for property selection that resulted in 112 inspections at 56 properties. During this phase, two REAC inspectors went to the same property on the same day and completed the same inspection. This approach enabled a statistical comparison of inspection results to statistically evaluate the repeatability and consistency of the REAC inspection protocol.

The results reflect a total of 224 inspections at 112 public housing properties.

ES2 - Results and Analysis

Results for property inspection score differential are presented. The score results are followed by summary statistics that quantify the causes for score differences. The causes for score differences that were investigated include:

[1] H.R. Conf. Rep. No. 106-988, at 68 (2000)

1. **Inspectable Item concurrence across inspections**. Inspectable Item concurrence is when two inspectors both agreed or concurred as to the condition of an Item under review. Namely, concurrence at the Item level means that both inspectors recorded Not Applicable (NA), No Observed Deficiency (NOD), or Observed Deficiency (OD). For example, inspectors concurred when they both recorded that the Inspectable Item "kitchen" in a unit had no defects (no-observed defect –NOD).

2. **Inspectable Item concurrence for each of the protocol's Inspectable Areas (Site, Building Exterior, Building System, Common Areas, Units) and their Inspectable Items.** This is when the Item concurrence defined in 1 above was evaluated separately for each of the five Inspectable Areas. For example, the concurrence for the Items in the Area "Building Exterior" was reviewed. In addition to Area concurrence, the Inspectable Items that form each of the five Inspectable Areas were also evaluated. For example, results are presented for the individual Common Area Item known as "Lobby".

3. **The defects that are largely responsible for scoring differences**. Each individual Inspectable Item in the protocol has its own set of relevant defects. An example is the broken/damaged hand railing defect for Site-Walkways. Average point differences for each defect were tabulated.

Score Differences

The differences in property scores across the study's inspections were analyzed with respect to absolute score differences. Absolute score was used in order to ignore whether the resulting point difference was positive or negative. The results were as follows:

	Phase I (Modified)[2]	Statistical Phase Phase II	Overall[3]
Average Absolute Score Difference	12.5	7.0	9.3
Median Absolute Score Difference	8.5	4.5	6.5
75th percentile	16.8	10.9	13.6
90th percentile	27.7	15.0	19.2

The statistically valid data from Phase II suggests the following:

- 50% of all scores fall below a five point absolute differential.
- 75% of all scores fall within a range of eleven points.
- 90% of all scores fall within a range of fifteen points.

Causes for Score Differences

Inspectable Item Level Concurrence:

Study data were analyzed at the Item level to determine concurrence (N/A, NOD, OD) across inspections. The results are as follows:

[2] Modified Phase I results are derived from Phase I after eliminating inspections which fell outside the 95th percentile for acceptable performance.
[3] Based on Modified Phase I results (See Section 3.2, page 15 for Modified Phase I definition).

	Modified Phase 1	Phase II (Statistically Valid Phase)	Overall[4]
- Average Item Level Agreement[5] (%)	85%	90%	87%
- Median Item Level Agreement (%)	86%	90%	89%
- 75th percentile	84%	88%	85%
- 90th percentile	80%	85%	82%

From the Phase II data, on average 90% of the Items received the same recording of their condition, and for 90% of the inspections, there was agreement for 85% of the Inspectable Items.

In addition to the variation quantified at the Item level, Item differences were analyzed from the Defect level down to the Severity level because these differences also contribute to score variance. This type of concurrence is when both inspectors record the same observation for a given Item, and includes cases when an Item having one or more Defects also has the same level of Severity (Level 1, 2, or 3) recorded. An example would be when both inspectors, while reviewing the same unit, recorded Level 3, because the window glass was broken. The results of this analysis are illustrated below:

	Modified Phase I	Phase II (Statistically valid Phase)	Overall[6]
% of all items with a difference with respect to NA	9.4%	5.5%	7.4%
% of all items with a difference with respect to NOD/OD	5.9%	4.9%	5.4%
% of all items with a different defect	1.9%	2.8%	2.4%
% of all items with a different severity level	0.1%	0.2%	0.1%
Net Item level concurrence through and including the severity level	83%	87%	85%

This data shows that, for Phase II of the study, inspectors had the same Item level agreement 87% of the time all the way through a defect's severity. The 13% average variance (100% - 87%) produced the average absolute score difference of 7 points for Phase II. (See the first table on page ii of this executive summary.)

Inspectable Area Results

Item concurrence was also evaluated for the protocol's Inspectable Areas in order to review the individual[7] performance of each Area for Phase II.

Inspectable area	N/A Concurrence	NOD/OD Concurrence	Overall Item Concurrence
Site	87%	86%	76%
Building Exterior	98%	91%	89%
Building Systems	89%	99%	88%
Common Area	96%	82%	95%
Units	97%	91%	89%
Overall	95%	91%	90%

[4] Based on Modified Phase I results (See Section 3.2, page 15 for Modified Phase I definition).
[5] Agreement at the item level means that both inspectors recorded Not Applicable (NA), No Observed Deficiency (NOD), or Observed Deficiency (OD).
[6] Based on Modified Phase I results (See Section 3.2, page 15 for Modified Phase I definition).
[7] Phase II results are shown. Results for the entire data set may be found in Table 3-5 on page 20.

The data shows that there is the least agreement at the Item level in the Inspectable Area Site and that this is a major contributor to score variance.

Individual Inspectable Item Concurrence

REAC also quantified the concurrence of the individual Items that each Area is comprised of. Approximately half of the protocol's 60 individual Items meet or exceed a concurrence rate of 90%, and over three-fourths of the Items exceed a concurrence rate of 80%. A summary of the results for all Items may be found in Table 3-6 on page 21.

Defects

In addition to analyzing Item concurrence, REAC also quantified the average property point difference for each Defect in the protocol. The results are as follows:

- 37% of the protocol defects had less than a 0.05 average point impact.
- 82% of the defects had a 0.50 average point impact or less.
- 93% of the defects had an average property score impact of less than a point.

A summary of the Defects that contributed the largest score variance may be found in Table 3-7 on page 23.

ES3 - Summary

This study's results and analyses support the following conclusions:

- The REAC physical inspection protocol can be consistently applied in the field to provide repeatable and representative results for assessment purposes.
- The Independent Quality Assurance (IQA) methodology[8] is a practical tool available to REAC for measuring inspector performance because peer to peer, protocol specific analytical comparisons are feasible.
- Some of the contract inspectors evaluated during Phase I of this study are in need of further review to determine if additional training is necessary.
- REAC's technical review procedures and the PASS Quality Assurance Program help to ensure that properties receiving an improper assessment can be identified and reviewed.

These results are based on the following:

- 88% of the protocol's Inspectable Items reviewed during the study received concurrence at the Item level. The result was 90% for the statistically valid Phase II of the study.
- 84% of the protocol's Inspectable Items reviewed received concurrence all the way down through the Severity level. The value improved to 87% for the statistically valid Phase II of the study.
- 50% of the inspections from the statistically valid Phase II of this study were within 5 points and 90% were within 15 points.

[8] The IQA methodology is a parallel inspection of the same property by a REAC QA inspector. See Appendix 2 for a description of the IQA methodology.

- The Inspectable Area Site has the lowest Inspectable Item concurrence.
- A limited number of defects have a typically large variance across inspectors.
- Five of the 14 contract inspectors evaluated under Phase I of this study exceeded the score average difference of all seventeen REAC QA inspectors in Phase II.
- A performance benchmark for missing Observed Defects was based on Phase II. Twelve of the 15 inspections judged non-standard by this measure were conducted by the five inspectors with large score differences.

1.0 - Introduction

The Real Estate Assessment Center (REAC) is responsible for centralizing and standardizing the way HUD evaluates the condition of the over 3,000 Public Housing Agencies (PHAs) and about 29,000 multifamily properties. One of REAC's primary functions is to monitor and assess the physical condition of properties and PHAs in which HUD has a financial interest. In this capacity, REAC has a clear mission of protecting the public interest by identifying and assessing the risk of loss from deterioration of properties and their accompanying facilities.

To meet this objective, REAC established a specific protocol for conducting physical inspections. The protocol defines the process for how an inspection must be conducted and is based on the standard that all of HUD's inventory should be *"decent, safe, sanitary, and in good repair"*. The resulting protocol criteria were established by the *Uniform Physical Condition Standards* [UPCS] *and Physical Inspection Requirements for Certain HUD Housing* (published in the Federal Register September 1, 1998) as amended.

To safeguard the REAC inspection process and protocol [UPCS], REAC developed a Quality Assurance Program (REAC QA). The goal of the REAC QA is to ensure the accuracy of inspection scores through proper application and interpretation of the inspection protocol. By achieving this goal, REAC and HUD can more efficiently utilize its limited resources to achieve positive change through effective and successful implementation of HUD's Public Housing Assessment System (PHAS) and similar programs in HUD's housing community.

To successfully implement a quality assurance program, REAC developed the PASS Quality Assurance Plan (QA Plan) to monitor contractor and inspector performance, and test inspection results for precision, replicability, and completeness. The QA Plan was recently modified and expanded to strengthen the quality of the inspections performed by REAC and its contract partners. The implementation of the QA Plan has resulted in an overall improvement in the quality of the inspection data received by REAC. An evaluation of CQA reviews[9] completed between the beginning of July 2000 and December 2000 showed that inspector performance being rated "outside of standard" improved from a historical rate of 12% to 2.5%[10].

Although execution of the QA Plan has resulted in improvements in data integrity, REAC's overall quality assurance model specifies that there may be a key fundamental risk to REAC in the implementation of the actual inspection system or protocol. Consistent application of the inspection protocol across the diverse HUD infrastructure and its varying workforce strengthens the value of REAC's assessment results. In reference to this objective, the conferees[11] directed REAC *"to perform a statistically valid test of PHAS [physical inspection system], conduct a thorough analysis of the results, and have the methodology and results reviewed by an independent expert."* The results of the tests would be used to quantify the consistency and repeatability of the existing inspection protocol.

REAC conducted a study to define the effectiveness and consistency of the REAC QA Program and its underlying physical inspection protocol. This report documents the study's findings. The report is broken down into the following sections:

[9] CQA reviews – Collaborative Quality Assurance (CQA) reviews – Refer to Appendix 2 of this report.
[10] *Report to Congress: PASS QA Program Report-February 2001*
[11] H.R. Conf. Rep. No. 106-988, at 68 (2000)

Section 2 – Testing Methodology - Defines how the study was designed for purposes of quantifying the repeatability and consistent application of the inspection protocol.

Section 3 – Results and Analyses – Presents the study's results and their related analysis.

Section 4 – Summary – Summaries the results and subsequent analyses of the study.

Appendices – Presents data and information relevant to the study, such as documentation of the sampling plan.

2.0 – Testing Methodology

2.1 Background

At the inception of the physical inspection program, REAC envisioned the feasibility to follow up any targeted or randomly selected contract inspection with an independent quality assurance (IQA) review. Under the IQA scheme, quality assurance or quality control inspectors would arrive a few days after the original inspector to complete a parallel review of the same property, including the same buildings, units, etc. that were previously inspected. By limiting the time between the original and follow up inspection, comparison results could be derived with minimal error introduced through the modification or repair of any noted defects. The results from this practice would enable REAC to evaluate the consistency and repeatability of the REAC inspection protocol.

REAC has held this QA methodology in reserve, primarily due to concerns related to the disturbance of residents, and focused on alternative, less obtrusive quality assurance methodologies such as the collaborative quality assurance (CQA) process.

For purposes of this current quantitative comparison and test of PHAS, however, REAC stipulated that the independent QA (IQA) review was the only viable option that could provide the necessary data for analytical comparative purposes. Consequently, REAC initiated implementation of the IQA protocol[12]. In addition to defining the specific QA protocol to be used in the study, REAC needed to find a set of representative properties to inspect. The methodologies employed for property selection and testing fulfillment via the IQA technique are described in further detail in this section.

2.2 – Inventory & Test Phase Introduction

REAC addressed several key considerations in developing and designing the methodology to test the accuracy and replicability of the physical inspection program via the IQA methodology.

- Time – The March 1, 2001 deadline for submittal of the report to the conferees. To meet this deadline, REAC had to complete field reviews by the end of calendar year 2000[13].
- Property Availability – For the specified time period, REAC had to identify properties coming up for inspection or just recently inspected as part of REAC's continuing physical assessment program.
- Property Attributes – The study had to include properties that were representative of the inventory across the differing areas of the country, including size, historical score, geography, etc.

In accordance with the overall testing objectives and in consideration of the issues defined above, REAC developed a two-phased approach:

- **Phase I – Contractor and QA Inspector Comparison** – In this phase, REAC sent a quality assurance inspector to complete a follow up IQA inspection for a property that had recently been inspected by a contract inspector.

[12] Independent quality assurance protocol – Refer to Appendix 2.
[13] Some inspections were completed in early January 2001 due to weather and other delays.

- **Phase II – Two QA inspectors –** For this phase, two REAC quality assurance inspectors went to a property to complete independent, concurrent inspections. As a result of scheduling and project availability, Phase II served as the statistically valid portion of the study, requested by the conferees.

While the program originally consisted of these two phases, a third phase was added during the study (Phase III). This third phase involved independent, concurrent inspections by a contract inspector and a member of the contractor's quality control (QC) team across five properties. As a further quality assurance, these inspections were observed by a member of the REAC QA team to help ensure impartiality during inspection completion. The results of the Phase III inspections were more similar to the Phase II inspections than to the Phase I inspections with relatively low average difference in scores between the two inspections at the same property. However, because only five properties were included in the Phase III inspections, the results from the inspections are not further discussed in this report.

Details associated with the testing design and methodologies of each testing phase are set forth in the following section (2.3).

2.3 – Methodological Details

Phase I Details

Phase I involved a short term, IQA comparison between the original contract inspections and the follow up QA inspections. Several teams of REAC QA inspectors completed 56 IQA inspections of properties that were recently inspected by a contract inspector.

Property selection

In order to minimize the temporal differences between the inspections conducted on different days, only properties that had been inspected and scored after November 2, 2000 were included in the study. The Phase I properties were selected using the following considerations:

- The most recent date of the inspection.
- Various administrative reasons (e.g. availability of HUD staff resources, travel time involved between sites, travel budget, etc.).
- Because the study's focus was on the public housing concerns about PHAS, only public housing properties were selected.
- The PHAs administering the selected properties all belong to the 9/30/00 Fiscal Year cohort[14].

Based on these considerations and the time available to implement Phase I of the study, use of a statistically valid random sample of properties was not feasible. Despite this fact, the properties that were selected in Phase I are reflective of the 9/30 PHA inventory in both size and score. This representation is provided in Figures 2-1 a and b and 2-2 a and b below:

[14] 9/30 PHAs were the only available properties for contract inspectors, since contractor task order(s) for the 12/31 PHAs had not yet been released.

Size Comparison

A comparison is provided relative to property size[15] for the 9/30 cohort and the properties inspected for Phase I of this study:

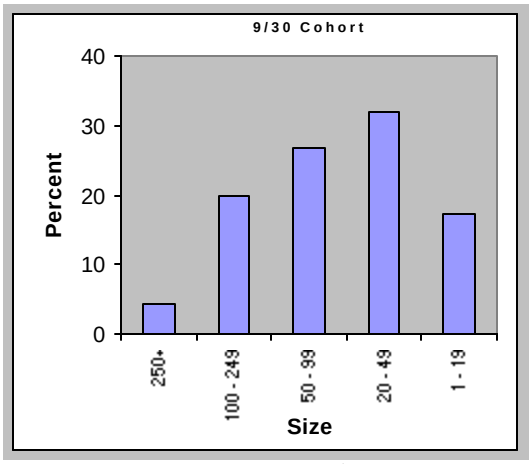


Figure 2-1 a

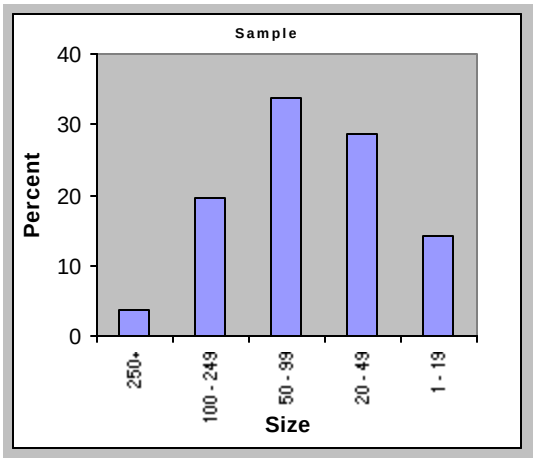


Figure 2-1 b

Score Comparison

A comparison is provided relative to property score[16] distribution for the entire 9/30 cohort and the properties reviewed for this study:

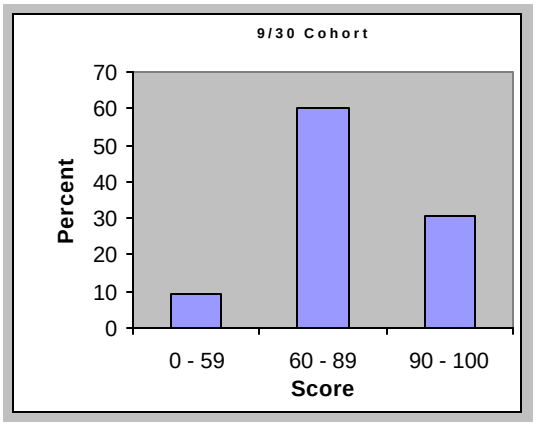


Figure 2-2 a

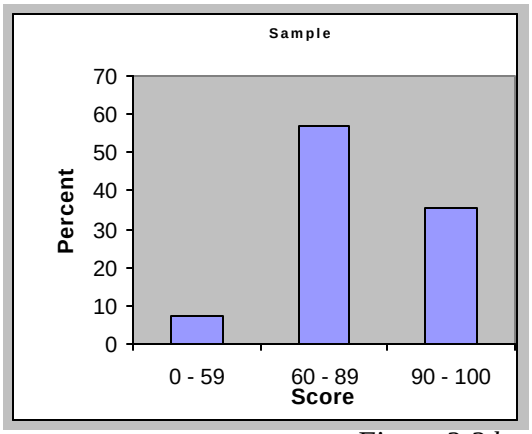
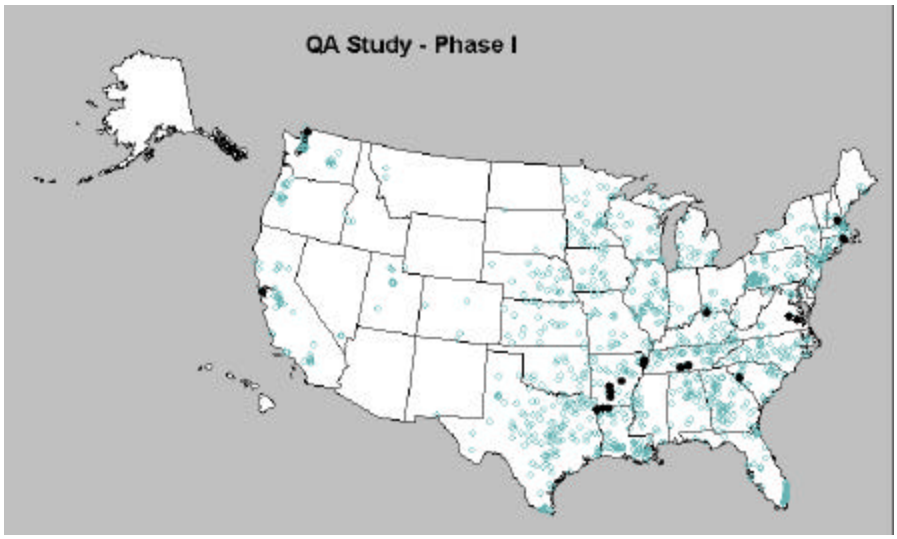


Figure 2-2 b

[15] As defined by unit count.
[16] Most recent score for each property.

An inventory of the 9/30 Phase I IQA inspections in reference to their geographic distribution is provided in Figure 2-3.



Darker circles represent test properties and the lighter-hollow circles represent the overall 9/30 property inventory.

Figure 2-3

Phase I provides a fundamental QA audit of REAC's physical assessment product. The properties included are similar to all public housing properties with respect to size and physical inspection scores[17], thereby yielding important results for quality assurance purposes.

Additional considerations

At the outset of each Phase I IQA inspection, QA inspectors were instructed to inspect the same sampled units and buildings that were inspected in the original contract inspection. To achieve this objective, QA inspectors were given a list of the buildings and units originally inspected by the contractor[18]. This approach removed inspection differences raised by sampling error. It was recognized that inspectors may not be able to re-gain access to all units from the original inspection. For such cases, the observations from the first inspection were "appended" after the inspection was completed to allow for scoring to be accomplished.[19]

Phase II Details

Phase I was designed to test the replicability of the protocol as reflected in a property's score by comparing the results against a contract inspector and a REAC QA inspector for the same basic inspection (same units, buildings, etc.). Because the same units and buildings were reviewed in each inspection, error introduced through selection of different buildings and units via sampling were largely controlled. In spite of these controls, it was still not fully known if property

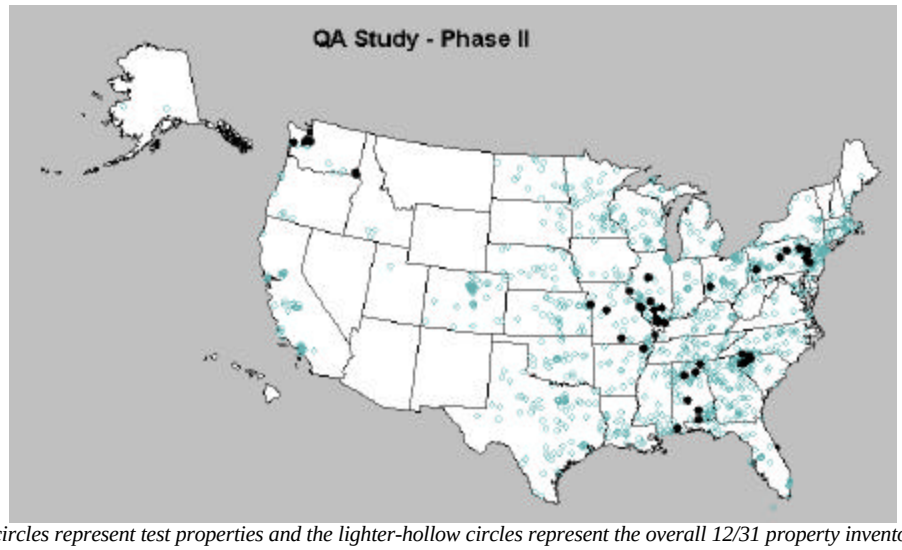
[17] The resulting Phase I sample was reflective of protocol performance across the 9/30 inventory with respect to score and size, but not indicative of the performance of the general contract inspector pool.
[18] QA inspectors were not provided with a copy of the original inspection report or scores so as not to compromise their judgment or objectivity, thereby helping to ensure the integrity of the review process.
[19] A summary is provided in Appendix 3. This involved 11% of the inspected units in Phase I with little impact (<1%) on the study results. Consequently, the impact was ignored.

conditions "changed" between inspections. Defects cited by the original inspector may have been repaired and new defects may have appeared. Phase II was designed to control these varying conditions and to eliminate both the sampling and temporal differences, since the two inspections would be completed concurrently, yet independently.

In Phase II, two inspections were conducted at a given property on the same day by two REAC QA inspectors.[20] In effect, one inspector would be conducting the original inspection while the second inspector would be conducting the IQA inspection. In each case, two QA inspectors both inspected 56 properties from a statistically formulated random sample of all PHAs with a FY end date of 12/31/00.[21]

Property selection

REAC randomly selected the properties for Phase II using a two-stage statistical sample design. The sample's first design stage was based on states which were classified into strata according to REAC contract area.[22] The second stage involved the selection of properties within the states. For each state, properties were divided into four strata according to the amount of effort (number of buildings and units) required to conduct an IQA inspection. This methodology yielded the following geographic distribution (Figure 2-4):



Darker circles represent test properties and the lighter-hollow circles represent the overall 12/31 property inventory.

Figure 2-4

For a more detailed discussion of the methodologies used in Phase II of the validation study, a technical paper has been prepared and is incorporated into this Report as *Appendix 5*. The paper documents the study's assumptions and limitations, defines the sampling population, expresses the algorithms for calculating probabilities of selection at both the State and property levels, explains the subsequent sample reduction and adjustments for property weight and refusals to

[20] REAC QA inspectors were used for Phase II because the task order for the 12/31 PHAs was not yet in place.
[21] 12/31 PHAs were selected since these properties were slated to be inspected in the later part of 2000 or in early 2001 thereby providing an available and representative set of inspections for statistical random sampling.
[22] For purposes of contract management, REAC divides the country into three geographically based regions/areas. The three regions/areas are: Region 1: the northeast and northern states of the Midwest; Region 2: the southeast and the southern states of the Midwest; Region 3: the west coast states. See Appendix 4 for the regional map (note: The terms "regions" and "areas" are interchangeable).

cooperate, and addresses representation of the population. The following working tables are included in the technical paper:

- Sample Probabilities for States
- Information About Strata within States
- Property Weights after Reduction in State Sample Size
- Comparison of the Quality Validation Sample to the Property Population

Additional considerations

In Phase II, each QA team was made up of two REAC QA inspectors. One inspector completed the inspection of record while the other provided the necessary comparative data for purposes of this study.

To ensure objectivity, QA staff were instructed to conduct independent inspections, not to communicate preliminary findings with each other, and for the first QA inspector not to "call out" deficiencies because they would be in the units at the same time. Calling out deficiencies is standard practice under the REAC protocol.[23] To help ensure further data integrity, the QA teams were rotated after the first week and again after the second week of inspections.

2.4 – Independent Review

A professional engineering firm, Louis Berger Group, was retained by the Department to serve as an independent assessment team. They were on-site with the QA inspectors during the inspection processes associated with Phases I and II of the study and had two basic charges:

1. Observing the independence of the QA inspectors during their reviews; and
2. Conducting independent analyses and reviews of how effective the inspectors were in the application of the inspection protocol. When at a property, Louis Berger gathered information to help in determining why scores and observations differed between inspections.

These independent analyses enable REAC to determine the extent to which inspection results are consistent and repeatable.

[23] For this study, it was necessary to have both inspectors in the unit at the same time to minimize disruption to the residents and to ease the administrative burden on PHAs who accompany the inspectors. The second inspector through an area did identify deficiencies for the property representative in accordance with the protocol.

3.0 – Results and Analysis

3.1 – Background and Introduction

REAC's goal is to provide sufficient and accurate inspection data for HUD to determine if the public housing stock is *"decent, safe, sanitary and in good repair"*. The UPCS and inspection software included uniform and objective inspection elements and definitions to classify deficiencies. HUD also developed a system that enables HUD to score properties inspected under the UPCS on a scale from 0 to 100 points. This scoring system assists HUD in managing the inventory of public housing. HUD also recognizes that the scalable scoring system is not perfect and is subject to human interaction. For this reason, the assessment of a PHA considers the condition of the entire inventory and PHAS designations reflect a band width approach (high performer is 90-100 points, standard performer is 60-89 points and troubled performer is <60 points).

To achieve this objective, REAC developed an inspection program/process that could be widely implemented across the relevant HUD inventory from a central location, while providing the necessary feedback and technical review options to enhance the quality of the pertinent inspection data. A review of the physical inspection process or life-cycle is illustrated below in Figure 3-1:

HUD Physical Inspection Process

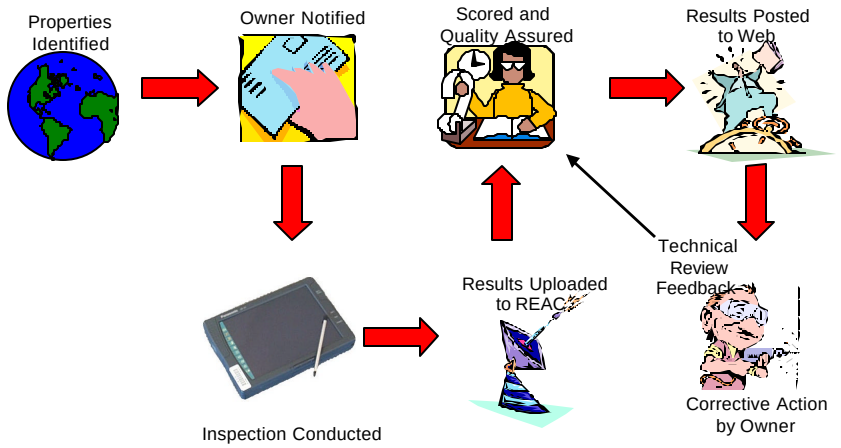


Figure 3-1

- Through use of the internet, REAC identifies the target population to be inspected and notifies management agents/owners and contract inspectors.
- The inspectors gather data on-site using a hand held computer.
- Raw data is uploaded electronically via the internet to REAC where it is validated, scored and reviewed for quality assurance.
- Scores and detailed reports are posted on the web for use by HUD program staff and property management agents and owners.

- Property management staff and/or property owners review results and provide any clarifications back to REAC via the Technical Review Process. As a result, scores may be adjusted.
- HUD staff work with property owners to help ensure needed repairs/improvements are completed in a timely manner.

A clear understanding of the various phases of the inspection life-cycle is critical to understanding how REAC derives inspection results. For example, one of the key components of the physical inspection process represented above is the Technical Review process. After an inspection is completed and approved by HUD, it is provided to the PHA via the internet. If the PHA determines that there are certain errors in the inspection report, the PHA has the opportunity to request a review of the inspection. HUD maintains a cadre of highly qualified QA inspectors. The job of the QA inspector is to review the performance of contract inspectors on-site, to ensure that the uniform and standardized protocols are being followed. These and other efforts taken by HUD are designed to ensure accurate and reliable inspection results. A summary of these activities is defined below:

Score/Assessment Issue	Methodology for Identification	Tools for Remediation
Too low	- Technical Review Process - REAC Quality Assurance Program - Contractor's Quality Control Program	- REAC's Technical Review Re-scoring process - Follow-up Inspection
Too high	- REAC Quality Assurance Program - Contractor's Quality Control Program	- Follow-up Inspection

In this section, the original inspection data collected during the "Inspection Conducted" and "Scoring" phases of the study, exclusive of any follow-up technical review and/or inspection modifications, are presented. The results are illustrated as follows:

- **Score** – How the property scores varied across the study.
- **Drivers for score differences** – What contributed to score differences.
  - *Item impact* – How the Inspectable Item disposition differed across the various inspections.
  - *Inspectable Area* - How each of the Inspectable Areas and their related Defects fared in reference to the system protocol.
  - *Defects* – Identification of the Defects that provided the largest score differences.

3.2 Score comparison and analysis

While this study is based on the premise that a comparison between inspectors for a given range of properties would provide a summary of the replicability of the inspection protocol and scoring, REAC has been tracking similar comparisons since REAC's inception. REAC is able to assess both inspectors and the inspection protocol by comparing an inspector's recent performance with prior results at the same properties.

Historical Comparative results

REAC has historically evaluated the performance of inspectors by comparing individual property inspection scores across years. The results of this are illustrated in Figure 3-2.

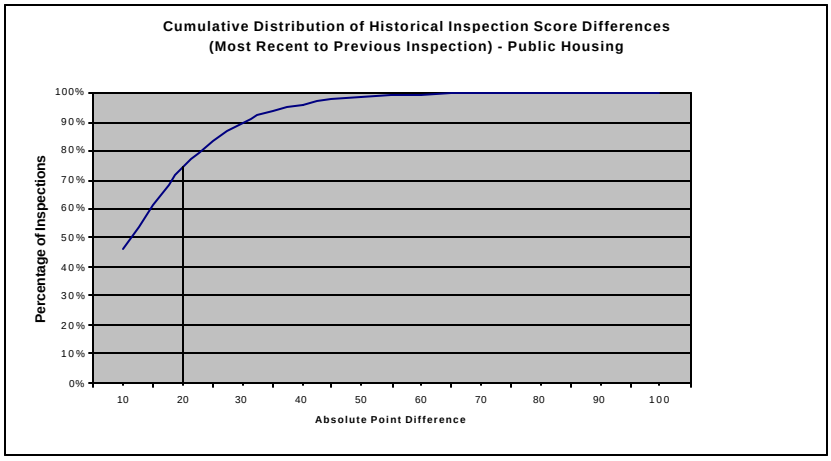


Figure 3-2

As shown above, when a property is reviewed across time, scores do change, with approximately 75% of scoring being within 20 points of the original result. Differences for a given set of inspections may be attributable to one or more of the following:

- different units and buildings sampled,
- repairs of old, and the presence of new defects – impact of time,
- inspector training, experience and diligence,
- inspection protocol changes, and/or
- changes in the methodology to score inspection results.

When comparing the property inspection scores over time, less variation is found when the inspections have been performed by the same inspector than when the inspections have been performed by different inspectors. About 70% of the property inspection scores are within 20 points when different inspectors were compared (Figure 3-3).

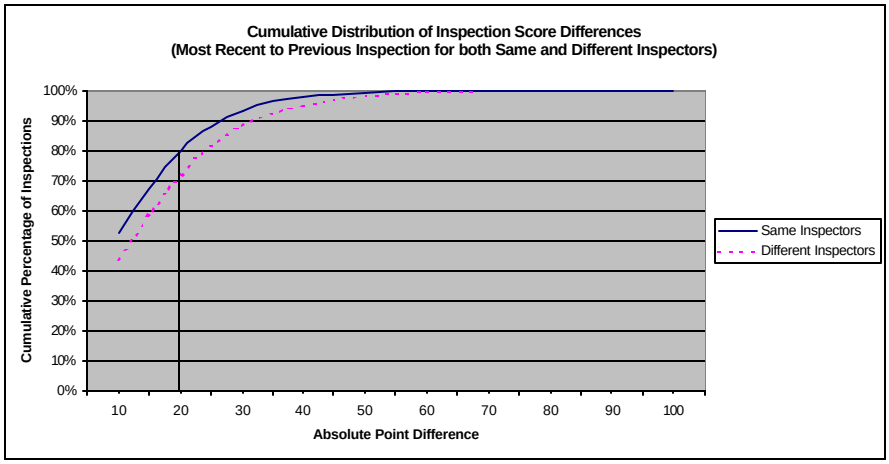


Figure 3-3

This data also shows that when the same inspector inspects a property, the percentage of scores within 20 points increases to 80%, signifying a 10 percentage point impact applicable to inspector differences. The remaining variance may be largely indicative of temporal, sampling, and protocol impacts.

Based on these results, it would be expected that Phase I of this study would yield similar results to those seen historically by different inspectors due to the time differential between the inspections, while Phase II would see tighter results due to the control of temporal effects. These comparisons are discussed below.

Comparative Results for this Study

For Phases I and II of the study, analogous inspections were completed on 112 properties. A breakout of the results are illustrated in Figure 3-4 below:[24]

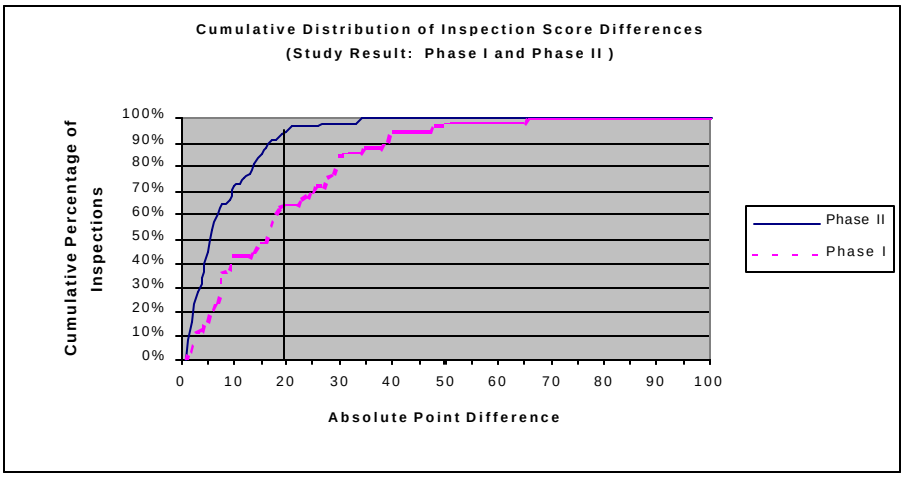


Figure 3-4

Phase I comparison results are similar to those represented in Figure 3-3 with less than 70% of the subsequent scores within 20 points of the original score.

To eliminate the temporal impacts by different inspectors, concurrent, independent inspections of the same property were completed in Phase II. These results are also illustrated above in Figure 3-4. The Phase II results show that when time and other factors are controlled, the results are improved significantly, with 95% of the inspections within 20 points.

[24] Refer to Appendix 1 for a listing of the individual score results for each property

This may also be seen in Table 3-1, which shows the average score differences between the historical comparisons and the different Phases of this study.

Table 3-1

	Historical		Current Study		
	Same Inspector	Different Inspector	Phase I	Statistical Phase Phase II	Overall
- Average Absolute Score Difference	12.0	15.0	17.2	7.0	12.1
- Median Absolute Score Difference	9.2	11.9	15.3	4.5	7.1
- Standard Deviation	10.3	12.5	14.3	6.8	12.3
- 75th percentile	17.3	21.3	27.0	10.9	16.8
- 90th percentile	26.2	31.8	37.5	15.0	27.7

The Phase II results represented above illustrate that when temporal and related impacts are controlled, the scoring differences are reduced in absolute terms, with 90% of the score comparisons within 15 points and the average score at 7 points.

Score Variability Across Study Phases

The data for Phase II of the study are fairly consistent, while the data for Phase I are more variable. REAC analyzed the Phase differences to define a driver for the increased variability in Phase I. REAC identified the variability for each individual Phase I inspector, because the results of this analysis would indicate if the variance experienced in Phase I was across inspections in general, or was the result of highly variant results for just a few inspectors. The results are illustrated below in Figure 3-5.

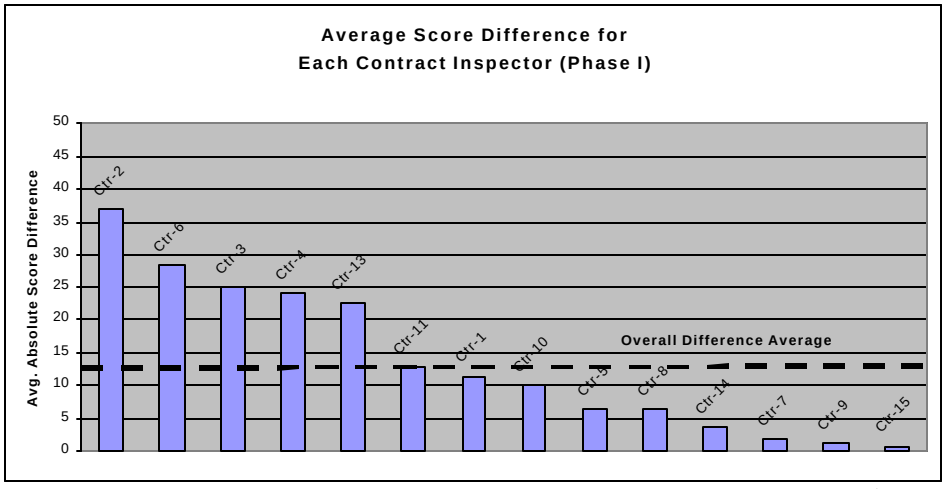


Figure 3-5

Figure 3-5 indicates that there are a number of inspectors whose variability far exceeds expected conditions, as about one-third of the Phase I inspectors average score difference is above the average absolute difference for all inspectors combined. A further analysis of Phase I inspector variability can be seen when results are compared against the Phase II inspector variance as shown in Figures 3-6 a and b.[25]

[25] Phase III results are not presented in the analysis since Phase III only had five inspections completed.

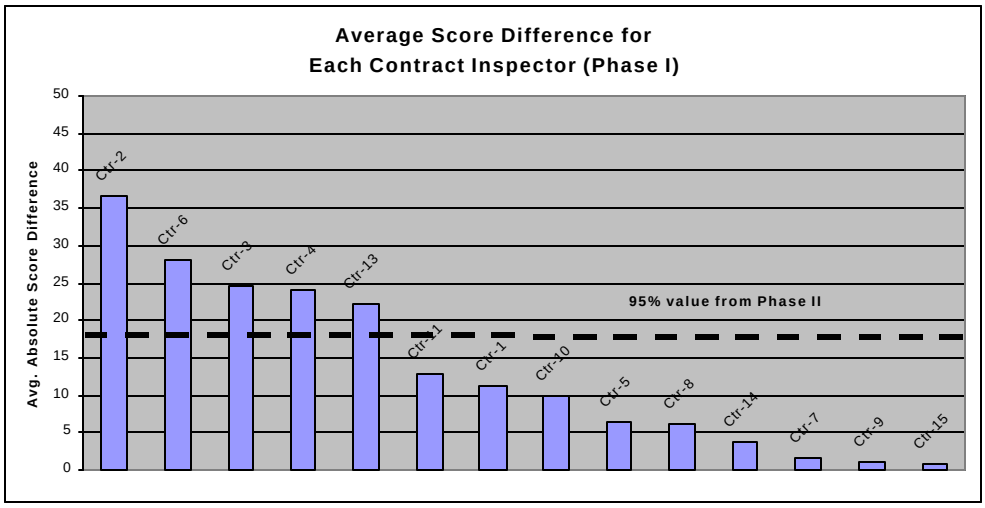


Figure 3-6 a

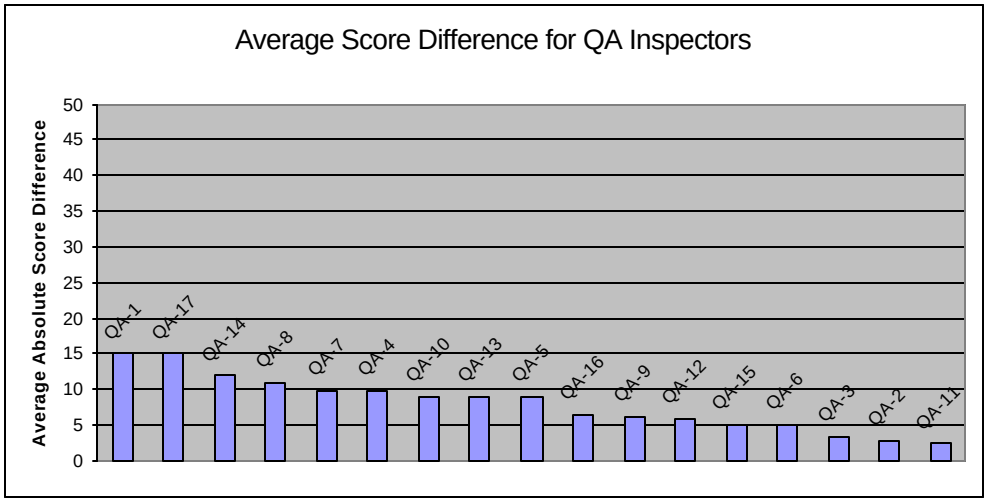


Figure 3-6 b

While the study does not reflect the performance of the overall contract inspector pool, the data suggests that a few of the Phase I contract inspectors were consistently deficient in their application of the REAC inspection protocol based on the following considerations:

- The Phase II inspectors provided less variability across individual inspectors, with all Phase II inspectors having an average absolute difference falling below about 15 points. This compares to 37 points for one Phase I inspector and about 25 points for four other Phase I inspectors.

- Phase II inspectors rotated teams throughout the study so that any consistently poorly performing Phase II inspectors (REAC QA) would have surfaced in the Phase II results[26].
- Using the average percentage values for each Phase II inspector (a maximum of 15 points difference in Figure 3-6b) as a statistical reference for defining outliers, five of the 14 Phase I inspectors would be considered outliers.
- Considering individual inspections in Phase I, instead of averages for inspectors, the five contract inspectors had average score differences greater than 95% of all Phase II individual inspection score differences.

Individual inspections were also examined to determine which, if any, of the 56 Phase I inspections might be considered outliers. In particular, the percent of all Inspectable Items for which one inspector did not observe a deficiency, but that was observed by the other inspector was utilized as a measure to compare inspections. Because inspectors are trained to make observations instead of deriving scores, it is more appropriate to use observations for judging how well an inspector performs. In Phase II it was found that for 95 percent of the inspections, inspectors missed observing a defect for less than six percent of all Inspectable Items. Using these Phase II results as a performance benchmark, it was decided to modify Phase I by removing those inspections where the inspector missed observing defects in more than 6 percent of the Items. This eliminated fifteen inspections for the Modified Phase I[27] results presented in the study. Twelve of the fifteen inspections removed for the Modified Phase I were conducted by the five inspectors shown above who had average score differences which appear to be outliers and not representative of most inspectors.

Figure 3.7 shows that 95% of all Phase II inspections met the performance benchmark defined above (less than 6%). For the contract inspectors in Phase I, however, the performance benchmark was met in 73% of the inspections.

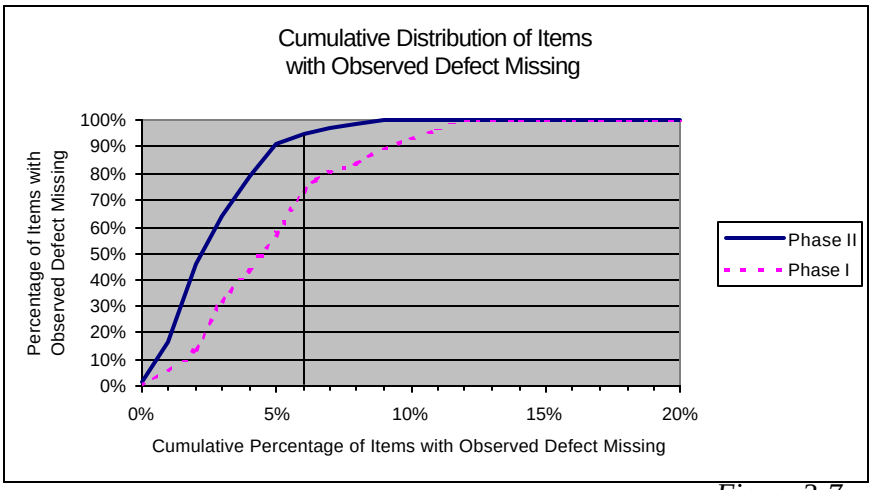


Figure 3-7

Based on these details, REAC believes that the Phase I results are not fully representative of the repeatability and consistency of the protocol, but rather have been biased due to the performance

[26] The Phase I and II REAC QA inspectors were largely the same, therefore if the REAC QA inspectors were the driver for the large variability in the Phase I results, a similarly high variability would have been reflected in the Phase II results when comparisons were made between QA inspectors.

[27] Modified Phase I excluded 15 inspections from Phase I where the inspectors missed observing defects in more than 6% of the Items.

of a few contract inspectors. In particular, the performance problems were manifested in the 15 inspections where too many defects found by the QA inspectors were not observed by the contract inspectors. With a closer following of the inspection protocol as required, the Phase I results would be more similar to the Phase II results. Accordingly, REAC reanalyzed the Phase I results without the data from the 15 outlying contract inspections. The modified results are presented in Figure 3-8 and Table 3-2.

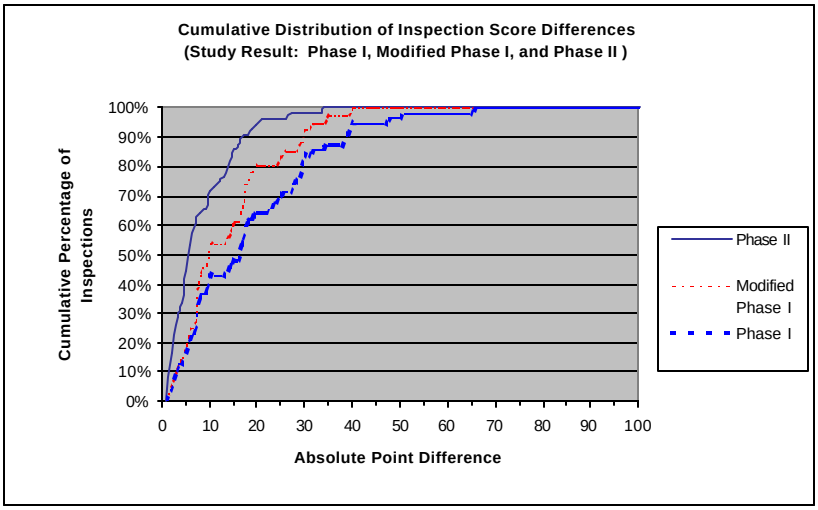


Figure 3-8

Table 3-2

	Phase I	Phase I (Modified)	Statistical Phase Phase II	Overall[28]
- Average Absolute Score Difference	17.2	12.5	7.0	9.3
- Median Absolute Score Difference	15.3	8.5	4.5	6.5
- Standard Deviation	14.3	10.1	6.8	8.7
- 75th percentile	27.0	16.8	10.9	13.6
- 90th percentile	37.5	27.7	15.0	19.2

Figure 3-8 and Table 3-2 indicate that when outlier inspections conducted by inspectors who demonstrate a statistically poor adherence to the REAC protocol are removed from the analysis, the Modified Phase I results more closely mirror those experienced in Phase II of the study

While the score comparison results currently show reasonably consistent scoring, the inspection process and the QA process are continually improving so that over time, inspection results show decreases in score variability. The drivers or causes for the score differences in this study are discussed in Section 3.3 below.

[28] Based on modified Phase I results.

3.3 - Drivers for Score Differences

Before addressing the drivers or causes for differences in scores across inspections and for the results of this study, it is critical to understand the basics of determining scores under the REAC protocol.[29] The REAC protocol has four main components that define a score:

- **Inspectable Area Weight** – There are five main Inspectable Areas: Site; Building Exterior; Building Systems; Common Areas; and Units. Each Inspectable Area has a calculated weight based on its general importance to the inhabitability of a given property. For example, Units carry more weight than Site, since units are where residents actually live and spend most of their time.
- **Inspectable Item Weight** – Each of the five main Inspectable Areas has Inspectable Items. For example, a kitchen is an Inspectable Item in a Unit. Each Inspectable Item is assigned a weight depending on how important that Item is to its Area. Using Units again as an example, kitchens would typically be considered to be more important than a Unit's porch.
- **Defect and its criticality** – Each Inspectable Item has Defects that define the reportable conditions of a particular Inspectable Item. For example, a non-working stove in a Unit-kitchen is a Defect. Each Defect is assigned a criticality in reference to its importance to its specific Item. A non-working stove is an important Defect.
- **Severity**– Each Defect has one or more levels of Severity. For example, a stove that does not work at all has a higher Severity level than a stove that has a single inoperable stove-top burner.

As a result of this data structure, score differences between two inspections of a given property are driven by differences in how each of these four scoring components are addressed and recorded by the two inspectors. Therefore, by analyzing the differences in Item, Defect, and Severity level recordings for the Inspectable Areas, REAC can better understand the main causes of score deviation and define approaches for resolving consistent issues.

Item, Defect, and Severity Level Observation Comparison and Analysis

The number or quantity of potential Inspectable Items, Defects, and their Severity that an inspector addresses during the course of a REAC inspection varies with the characteristics of the property under review. Properties with a larger number of inspected buildings and/or inspected units have a greater number of observations that an inspector will address when compared to properties with fewer buildings and/or fewer units. Characteristics of particular buildings and/or units provide for a different level of potential observations. For example, a building with several Common Areas (e.g. lobby, community room, laundry room, etc.) has more potential observations than a building with just a lobby.

Observations recorded by a REAC inspector during the course of an inspection drive the resulting score for that property. Differences in observations lead to a difference in an inspection's score. As a result, REAC quantified the differences in observations across the

[29] For a detailed description of scoring refer to the Federal Register (6/28/00 Page 39988 – Vol. 65, No. 125).

various inspections that made up this study. Differences for Inspectable Items were addressed at three protocol levels:

- **Item level**– The Item depicts the particular characteristics that constitute a given Inspectable Area. For example, a bathroom in a dwelling unit is an Item in the units Inspectable Area.
- **Defect level** – The Defect represents the specific deficiencies related to a specific Inspectable Item. For example, an inoperable toilet in a unit is a Defect in the Inspectable Item bathroom.
- **Severity level**– The Severity further defines the condition of a reported Defect. For example, a level 3 Defect for a range/stove in a kitchen indicates that the range/stove either does not work or is not safe to operate, while a level 2 Defect for a range/stove is indicative of a single burner that is not operational.

An analysis of this study's data is presented below.

Item Level Consistency

Inspector concurrence at the Inspectable Item level denotes an agreement as to the condition of the article under review. For example, if two inspectors agree that the bathroom in a particular unit has no deficiencies, they both would record NOD.[30] If one noted a defect while the other did not, they would have opposing recordings at the Item level (OD vs. NOD).

For purposes of this study, REAC quantified the differences between the observations at the Inspectable Item level across the various inspections. The results are listed Table 3-3.[31]:

Table 3-3

	Phase 1	Modified Phase I	Phase II	Overall[32]
- Average Item Level Agreement[33] (%)	85%	85%	90%	88%
- Median Item Level Agreement (%)	86%	86%	90%	88%
- Standard Deviation	5%	5%	4%	5%
- 75th percentile	83%	84%	88%	85%
- 90th percentile	78%	80%	85%	82%

The results presented in Table 3-3 indicate that the REAC protocol provided a concurrence at the Inspectable Item level 88% of the time, with the results from the statistically valid portion of the study at 90%. These differences provide sufficient cause for the average 12 point score (refer to Table 3-1) difference across the inspectors. To further understand the score variance, an Inspectable Item concurrence analysis must be carried to the Defect level then through the Severity level in order to capture all score differential disagreements.

Item Concurrence Analysis Through the Defect Level and Severity Level

Expanding upon the above analysis, REAC evaluated the disposition of an Inspectable Item in the protocol to the Defect level, and then through the Severity level. In particular, the Inspectable Item, Defect, and Severity data from the various Phases of the study were reviewed to quantify

[30] NOD = "No Observed Deficiency"; OD = "Observed Deficiency"; N/A = "Not Applicable"
[31] Refer to Appendix 6 for the item level results for each inspection.
[32] For purposes of this analysis, REAC employed all the Phase I data to define overall.
[33] Agreement at the item level means that both inspectors recorded NA, NOD, or OD.

the concurrence across different inspectors. Data were analyzed in accordance with the following:

- Percentage of all Items that had a difference with respect to N/A. This difference occurred when one inspector stated that an Inspectable Item existed while the other stated that it did not.
- Percentage of all Items that had a difference with respect to NOD/OD. This difference occurred when one inspector stated that an Inspectable Item is defective while the other did not.
- Percentage of all Items that had a difference in the Defect that was selected. This difference occurred when both inspectors indicated that an Inspectable Item was defective, but they selected a different Defect to characterize the damage.
- Percentage of all Items that had a different Severity level selected for common Defects. This occurred when inspectors had a difference with respect to the Severity level of the Defect.

The results are illustrated in Table 3-4.

Table 3-4

	Phase I	Modified Phase I	Phase II Statistically valid Phase	Overall[34]
% of all items with a difference with respect to NA	8.8%	9.4%	5.5%	7.3%
% of all items with a difference with respect to NOD/OD	6.6%	5.9%	4.9%	5.9%
% of all items with a different defect	2.1%	1.9%	2.8%	2.5%
% of all items with a different severity level	0.1%	0.1%	0.2%	0.1%
Net Item level concurrence through and including the severity level	82%	83%	87%	84%

The results illustrated above indicate that inspectors drew the exact same conclusion with respect to an Item, Defect and the Severity level 84% of the time[35]. The 16% discrepancy resulted in an average absolute score difference of 12 points (refer to Table 3-1). These differences are lower for the statistically valid Phase of the study, whereby complete Item agreement approached 87% with the 13% discrepancy driving an average 7 point difference.

While the above statistics quantify the differences at the overall property level, it is also critical to quantify the variation across the protocol's inspectable areas, as defined below.

Inspectable Area/Item Review

REAC analyzed the frequency of agreement for each Inspectable Area and each Inspectable Item at the following levels:

Overall Item Level concurrence – This is similar to the analysis described above when it was determined what the overall agreement was between inspectors[36] for the five main Inspectable Areas.

[34] For purposes of this analysis, REAC employed all the Phase I data to define overall.
[35] REAC's Spring 2000 study – *Uniform Physical Condition Standard (UPCS) Protocol and Inspection Software (v2.3) Testing* report illustrated an approximate 0.5% Item non-concurrence (through the Defect Level and Severity Level) rate associated with user error of the recording device(DCD), i.e. a defect was recorded when it did not exist. Inappropriate defects can be removed through the Techincal Review process.
[36] Item Level concurrence = N/A to N/A; NOD to NOD, OD to OD

N/A concurrence – Agreement to the existence of an Inspectable Item was evaluated. An example of a difference (non-concurrence) occurred when one inspector stated that an item was N/A and the other stated it was OD[37].

NOD and OD Concurrence – For Inspectable Items on which inspectors concurred that the Inspectable Item existed, the status of the Inspectable Item with respect to whether or not it was defective[38].

The Inspectable Item level results for the five main Inspectable Areas are listed in Table 3-5.[39]:

Table 3-5

Inspectable area	N/A Concurrence	NOD/OD Concurrence	Overall Item Concurrence
Site	87%	81%	73%
Building Exterior	98%	88%	86%
Building Systems	89%	96%	87%
Common Area	94%	82%	93%
Units	96%	89%	87%
Overall	94%	89%	88%

The results concur with the values previously presented in Table 3-5, and show the following:

- 94% of all Items are agreed to exist or not exist for a given property (N/A agreement).
- 89% of all Items are agreed to be defective or not defective (NOD/OD agreement).
- 88% of the Items have overall agreement at the Item level.
- Site has the lowest N/A, NOD/OD, and overall Item concurrence.
- Building Exterior has the highest Item level agreement with respect to whether an Item exists.
- Building Systems has the highest concurrence with respect to defective Items.

To further characterize how the specific Areas impact score differential, REAC quantified the concurrence rate for each individual Item in the REAC protocol. The results are discussed below.

Individual Item Concurrence

In addition to representing the Item concurrence for an inspection and each of its five Inspectable Areas, REAC also quantified concurrence for each of the Inspectable Items in the REAC protocol. As with Table 3-5, the data was analyzed with respect to the three following criteria:

- **Overall Item Level concurrence**
- **N/A concurrence**
- **NOD and OD Concurrence**

[37] N/A non-concurrence = N/A to NOD; N/A to OD
[38] NOD and OD concurrence = NOD to NOD; OD to OD
[39] For purposes of this analysis, REAC employed all the data from all inspections and did not break them out separately by specific Phase of the study. If only the Phase II results were used in this analysis, the results would be higher. However, for purposes of evaluating potential misapplication of the protocol at the item and defect levels, it is valuable to employ all the study data in characterizing differences across Inspectable Areas and Items.

The individual concurrence results are summarized and ranked[40] in Table 3-6 for the entire data set.[41]

Table 3-6

	Overall Item Concurrence	Overall Rank	NA Concurrence	NA Rank	NOD/OD Concurrence	NOD/OD Rank
Site	**73%**		**87%**		**81%**	
Refuse Disposal	58%	1	62%	1	93%	9
Fencing and Gates**	64%	2	78%	2	80%	5
Grounds	69%	3	100%	8	69%	1
Walkways/Steps	72%	4	100%	9	72%	2
Storm Drainage	75%	5	82%	4	91%	8
Parking Lots/Driveways/Roads	76%	6	95%	7	80%	4
Market Appeal	76%	7	100%	10	76%	3
Play Areas and Equipment	77%	8	81%	3	89%	6
Mailboxes/Project Signs	79%	9	85%	5	93%	10
Retaining Walls**	85%	10	88%	6	90%	7
Building Exterior	**86%**		**98%**		**88%**	
Walls	75%	1	100%	6	75%	1
Roofs	80%	2	100%	7	80%	2
Windows	82%	3	98%	4	83%	3
Doors	87%	4	98%	3	89%	4
Fire Escapes	91%	5	92%	1	98%	6
Lighting	95%	6	96%	2	99%	7
Foundations	96%	7	100%	5	96%	5
Building System	**87%**		**89%**		**96%**	
Fire Protection	67%	1	74%	3	66%	1
Exhaust System	70%	2	70%	1	94%	3
HVAC	73%	3	73%	2	100%	7
Domestic Water	96%	4	99%	6	97%	4
Sanitary System	97%	5	99%	5	97%	5
Electrical System	98%	6	100%	8	98%	6
Emergency Power	99%	7	99%	4	92%	2
Elevators	100%	8	100%	7	100%	8
Common Area	**93%**		**94%**		**82%**	
Patio/Porch/Balcony	68%	1	68%	1	98%	15
Trash Collection Areas	86%	2	86%	2	81%	10
Other Community Spaces	89%	3	90%	3	65%	3
Storage	89%	4	91%	4	83%	13
Closet/Utility/Mechanical	91%	5	94%	6	65%	2
Halls/Corridors/Stairs	92%	6	93%	5	81%	11
Basement/Garage/Carport	94%	7	94%	7	80%	8
Restrooms/Pool Structures	96%	8	98%	8	71%	4
Office	97%	9	99%	11	71%	5
Kitchen	97%	10	98%	9	81%	12
Lobby	98%	11	98%	10	85%	14
Community Room	98%	12	99%	12	80%	9
Laundry Room	99%	13	99%	13	73%	6
Day Care	99%	14	100%	14	75%	7
Pools and Related Structures	100%	15	100%	15	0%	1
Dwelling Units	**87%**		**96%**		**89%**	
Laundry Area (Room)**	71%	1	74%	1	93%	10
Doors	71%	2	100%	9	71%	1
Kitchen	76%	3	100%	10	76%	2
Bathroom	77%	4	100%	7	77%	3
Patio/Porch/Balcony	82%	5	82%	2	100%	17
Walls	83%	6	100%	11	83%	4
Windows	85%	7	100%	12	85%	5
Stairs	87%	8	87%	3	98%	16
Hot Water Heater	87%	9	93%	4	93%	9
Ceiling	90%	10	100%	8	91%	6
Electrical System	91%	11	100%	13	91%	7
Outlets/Switches	93%	12	100%	14	93%	8
Call-for-Aid	95%	13	96%	5	97%	14
Smoke Detector	95%	14	100%	15	95%	11
Lighting	96%	15	100%	16	96%	12
HVAC System	96%	16	99%	6	97%	15
Floors	96%	17	100%	17	96%	13
Total	**88%**		**94%**		**89%**	

[40] The items are ranked based on their relevant concurrence within a specific area. A rank of "1" indicates that this item had the lowest concurrence.

[41] Results for Phase II are presented in Appendix 6.

The results indicate that inspectors differ with respect to deciding whether or nor a particular Inspectable Item exists within a given area (N/A Concurrence) or whether or not that Item is defective (NOD/OD concurrence), as discussed below:

- In Site the lowest concurrence with respect to deciding whether or not an Inspectable Item exists is with the Item Refuse Disposal (62% overall concurrence). This means that 38% of the time inspectors differed as to the existence of this Inspectable Item. However, when they agreed that Refuse Disposal was there, they concurred as to its state or condition 93% of the time. A similar relationship may be found in dwelling Units. Laundry Areas in dwelling Units has the lowest concurrence (74%) with respect to defining whether or not a Laundry Area exists. Notwithstanding, when it was agreed that there was a Laundry Area, the determination as to its condition was the same 93% of the time.

- Grounds had a 100% agreement as to the Inspectable Item's presence at the various properties, but Grounds had the lowest concurrence (69%) with respect to whether or not the Grounds were defective (NOD/OD). Another example is Unit doors. Unit doors had 100% agreement as to their existence, but only a 71% agreement as to their condition.

The above examples indicate that when two inspectors differ in their review of an Inspectable Item, they are driven by two basic errors:

1. **Item level definitional error –** An inspector does not accurately apply the Item level definitions that define what a specific Item is and where it may be found in the relevant Inspectable Area. For the Refuse Disposal example, inspectors may be confused by internal versus external trash collection areas.
2. **Defect level definition error –** An inspector does not accurately apply the Defect definitions when characterizing the condition or state of an Inspectable Item that has been determined to exist. For the Grounds example, inspectors may be confused over the 5% of the total area "trigger" that is part of the definitions used to determine the Severity level.

The quantification of the data in this study as represented in Table 3-6 adds value to the QA Plan.

Problem Defects with respect to scoring

To further support the analysis and results reported for the Defect level definition error described above, REAC completed additional analyses to determine which defects drive the biggest scoring differentials. Although a damaged dryer vent Defect for a laundry area in a Unit ranks somewhere in the middle, the impact of the Defect would be small on the overall property score differential. The results of this analysis may be found in Appendix 7 to this report. A summary of the defects by Inspectable Area where the average difference was 1 point or larger is presented in Table 3-7.

Table 3-7

Defect Score Differences			
		Overall Average Property Point Differences (Phase I and II)	**Overall Average Property Point Differences (Phase II Only)**
Site			
Grounds	Erosion/Rutting Areas (H&S - NLT)	2.3	1.8
Grounds	Overgrown/Penetrating Vegetation	1.5	1.4
Walkways/Steps	Broken/Missing Hand Railing (H&S - NLT)	1.3	1.3
Fencing and Gates	Damaged/Falling/Leaning (H&S - NLT)	1.1	1.1
BldgExt			
Walls	Missing Pieces/Holes/Spalling	1.4	1.3
Walls	Cracks/Gaps	1.2	1.2
Foundations	Cracks/Gaps	--	1.1
BldgSys			
Fire Protection	Missing/Damaged/Expired Extinguishers	1.4	--
CA			
No Defect above 1 point			
DU			
Electrical System	GFI - Inoperable (H&S - NLT)	2.6	2.5
Kitchen	Range/Stove - Missing/Damaged/Inoperable	2.5	2.1
Kitchen	Refrigerator - Missing/Damaged/Inoperable (H&S - NLT)	1.3	1.1
Doors	Damaged Hardware/Locks	1.1	1.3
Bathroom	Shower/Tub - Damaged/Missing (H&S - NLT)	--	1.0
HS			
Hazards	Tripping	4.6	3.5
Emergency/Fire Exits	Emergency/Fire Exits Blocked/Unusable	2.2	2.4
Infestation	Insects	1.8	1.5
Electrical Hazards	Exposed Wires/Open Panels	--	1.3

4.0 - Summary

In 1998, HUD stipulated that certain housing in which it had a financial interest must meet clear physical condition standards to help ensure that these facilities are *decent, safe, sanitary and in good repair*. To support this effort, regulations[42] described new physical inspection procedures that would enable HUD to determine conformity with such standards. In particular, the condition and inspection regulations targeted three key objectives:

1. Consistency in physical condition standards for HUD housing;
2. Standardization of the inspection process to determine compliance with standards; and
3. Implementation of an electronically-based inspection system to objectively evaluate, rate, and rank the physical condition of HUD housing.

REAC was charged with the responsibility of implementing a program to achieve these three objectives. Accordingly, REAC established a specific electronically based protocol for conducting physical inspections in order to attain consistent and standardized results. This system initially went into operation in the fourth quarter of 1998. Since that time, REAC has implemented the defined protocol and its related software at over 40,000 properties completing over 64,000 total inspections.

While quality assurance initiatives have been in operation since the protocol's commencement, HUD had yet to fully quantify the repeatability of the protocol and the consistency of its related software, mainly due to issues associated with resident disruption. Nevertheless, REAC recently completed a study to quantify protocol concurrence. This report attempted to define the study's results and, through its ensuing analysis, define how the system is generally operating. The results and analysis of this study support the following:

- The REAC physical inspection protocol can be consistently applied in the field to provide repeatable and representative results for assessment purposes.
- The IQA methodology[43] is a practical tool available to REAC for measuring inspector performance since peer to peer, protocol specific analytical comparisons are feasible.
- Some of the contract inspectors evaluated during Phase I of this study are in need of review.
- REAC's technical review procedures and Quality Assurance Program help to ensure that properties receiving an improper assessment have a means for identification and subsequent resolution.

These results are based on the following:

- 88% of the protocol's Inspectable Items reviewed during the course of this study received concurrence at the Item Level. The result was 90% for the statistically valid Phase II of the study.
- 84% of the protocol's Inspectable Items reviewed received concurrence all the way down through the Severity Level. The value improved to 87% for the statistically valid Phase II of the study.

[42] 24 CFR Parts 5, et al.
[43] The IQA methodology is essentially a parallel inspection of the same property by a REAC QA inspector. Refer to Appendix 2 for a description of the IQA methodology.

- 50% of the inspections from the statistically valid Phase II of this study were within 5 points and 90% were within 15 points.
- The Inspectable Area Site has the lowest Inspectable Item concurrence (73%).
- A limited number of Defects have an average property point impact of more than 1 point between inspectors.
- Five of the contract inspectors evaluated under Phase I of this program exceeded the average differences of all of the REAC QA inspectors in Phase II and exceeded 95% of the individual inspection score differences.

Appendix 1 – Background Inspection and property information

Inspection Data

Phase I

Properties	States	Days Between Inspections	Inspectors		Scores	
			Inspector 1	Inspector 2	Inspection 1	Inspection 2
Phase1A	9	28	Ctr-9	QA-2	77	79
Phase1B	11	28	Ctr-7	QA-2	62	63
Phase1C	5	26	Ctr-8	QA-2	85	78
Phase1D	12	28	Ctr-2	QA-8	99	72
Phase1E	12	27	Ctr-2	QA-8	98	33
Phase1F	12	24	Ctr-2	QA-14	94	67
Phase1G	12	23	Ctr-2	QA-8	99	50
Phase1H	12	25	Ctr-2	QA-8	97	59
Phase1J	12	26	Ctr-2	QA-8	99	86
Phase1K	13	26	Ctr-3	QA-5	92	64
Phase1L	13	33	Ctr-3	QA-5	100	67
Phase1M	13	30	Ctr-3	QA-5	97	84
Phase1N	13	25	Ctr-14	QA-5	72	68
Phase1P	13	25	Ctr-14	QA-5	73	71
Phase1Q	13	25	Ctr-14	QA-5	79	85
Phase1R	13	24	Ctr-14	QA-5	71	72
Phase1S	13	29	Ctr-14	QA-5	76	83
Phase1T	14	32	Ctr-15	QA-2	98	97
Phase1U	14	24	Ctr-13	QA-2	79	57
Phase1V	12	25	Ctr-2	QA-8	98	52
Phase1W	12	26	Ctr-2	QA-8	98	70
Phase1X	2	30	Ctr-1	QA-1	68	74
Phase1Y	2	33	Ctr-1	QA-1	72	87
Phase1Z	2	30	Ctr-1	QA-4	65	58
Phase1AA	2	30	Ctr-1	QA-4	68	73
Phase1BB	2	23	Ctr-4	QA-3	91	54
Phase1CC	2	22	Ctr-4	QA-3	77	56
Phase1DD	2	29	Ctr-6	QA-7	86	59
Phase1EE	2	50	Ctr-6	QA-6	88	58
Phase1FF	2	21	Ctr-1	QA-4	60	56
Phase1GG	2	31	Ctr-1	QA-1	67	84
Phase1HH	2	20	Ctr-1	QA-4	72	74
Phase1JJ	2	32	Ctr-1	QA-1	74	67
Phase1KK	2	20	Ctr-4	QA-3	95	88
Phase1LL	2	21	Ctr-1	QA-3	81	72
Phase1MM	2	51	Ctr-1	QA-10	88	59
Phase1NN	2	31	Ctr-1	QA-3	86	61
Phase1PP	2	61	Ctr-1	QA-10	89	81
Phase1QQ	3	22	Ctr-10	QA-6	64	56
Phase1RR	3	25	Ctr-10	QA-6	62	57
Phase1SS	3	32	Ctr-10	QA-18	51	63
Phase1TT	3	26	Ctr-10	QA-16	55	71
Phase1UU	3	24	Ctr-10	QA-18	57	53
Phase1VV	3	28	Ctr-10	QA-18	53	51
Phase1WW	3	34	Ctr-10	QA-16	91	74
Phase1XX	3	34	Ctr-10	QA-6	81	65

Phase1YY	6	29	Ctr-4	QA-7	82	59
Phase1ZZ	6	26	Ctr-6	QA-7	80	42
Phase1AAA	6	30	Ctr-6	QA-7	98	80
Phase1BBB	6	29	Ctr-6	QA-7	88	60
Phase1CCC	6	25	Ctr-4	QA-7	80	42
Phase1DDD	6	25	Ctr-11	QA-15	92	74
Phase1EEE	6	25	Ctr-11	QA-7	90	83
Phase1FFF	6	28	Ctr-4	QA-7	93	76
Phase1GGG	15	18	Ctr-5	QA-16	93	99
Phase1HHH	2	30	Ctr-1	QA-4	73	57

Inspection Data

Phase II

Properties	States	Inspectors		Scores	
		Inspector 1	Inspector 2	Inspection 1	Inspection 2
Phase2A	1	QA-12	QA-3	54	56
Phase2B	1	QA-12	QA-3	84	92
Phase2C	1	QA-12	QA-3	52	50
Phase2D	1	QA-12	QA-5	92	73
Phase2E	1	QA-12	QA-3	65	64
Phase2F	1	QA-12	QA-5	91	85
Phase2G	1	QA-12	QA-3	63	63
Phase2H	1	QA-12	QA-5	98	84
Phase2J	4	QA-12	QA-2	59	62
Phase2K	4	QA-12	QA-2	63	66
Phase2L	4	QA-16	QA-5	89	89
Phase2M	4	QA-16	QA-5	82	73
Phase2N	4	QA-16	QA-5	88	76
Phase2P	4	QA-16	QA-5	92	86
Phase2Q	4	QA-15	QA-4	95	77
Phase2R	4	QA-16	QA-3	89	85
Phase2S	4	QA-15	QA-4	94	93
Phase2T	4	QA-15	QA-4	90	91
Phase2U	4	QA-16	QA-5	90	95
Phase2V	4	QA-15	QA-4	94	90
Phase2W	8	QA-10	QA-8	52	45
Phase2X	8	QA-9	QA-6	87	91
Phase2Y	8	QA-9	QA-6	70	60
Phase2Z	8	QA-17	QA-1	63	78
Phase2AA	8	QA-15	QA-6	93	92
Phase2BB	8	QA-10	QA-8	77	64
Phase2CC	8	QA-15	QA-6	60	53
Phase2DD	8	QA-15	QA-6	86	85
Phase2EE	10	QA-14	QA-4	51	66
Phase2FF	10	QA-14	QA-4	62	75
Phase2GG	10	QA-14	QA-4	53	71
Phase2HH	10	QA-14	QA-7	83	94
Phase2JJ	10	QA-15	QA-6	86	82
Phase2KK	10	QA-15	QA-6	91	78
Phase2LL	10	QA-14	QA-4	57	48
Phase2MM	10	QA-14	QA-7	81	79
Phase2NN	10	QA-14	QA-7	57	82
Phase2PP	10	QA-14	QA-7	79	80
Phase2QQ	10	QA-15	QA-6	99	98
Phase2RR	10	QA-15	QA-6	81	75
Phase2SS	12	QA-11	QA-2	81	80
Phase2TT	12	QA-11	QA-2	96	98
Phase2UU	12	QA-11	QA-2	88	93
Phase2VV	12	QA-11	QA-2	86	89
Phase2WW	12	QA-11	QA-2	96	94
Phase2XX	12	QA-10	QA-8	73	79
Phase2YY	12	QA-11	QA-2	51	55
Phase2ZZ	12	QA-11	QA-2	71	70

Phase2AAA	15	QA-13	QA-2	71	75
Phase2BBB	15	QA-13	QA-8	88	76
Phase2CCC	15	QA-13	QA-8	69	68
Phase2DDD	15	QA-13	QA-8	86	54
Phase2EEE	15	QA-13	QA-8	62	47
Phase2FFF	15	QA-13	QA-2	84	87
Phase2GGG	15	QA-13	QA-2	66	71
Phase2HHH	15	QA-13	QA-8	67	67

Appendix 2 – Quality Assurance Field Review Tools

Two tools are used in the field to collect data and measure the accuracy of inspections as well as the performance of inspectors. The tools have been designed to provide a standardized means of collecting and evaluating data in a manner that is consistent with the inspection protocol. Performance data is captured to the level of specificity required by the activity (evaluation of an inspector or assessment of inspection accuracy) for evaluation, training, and process improvement actions.

Collaborative Quality Assurance (CQA) Review Tool

The collaborative quality assurance (CQA) review tool is designed to guide a QA reviewer through a standardized protocol for evaluating an inspector's ability to properly perform inspections in the field. The CQA tool is comprised mainly of the "Evidence Examined Checklist" for Level 2 in the QA model.

The CQA activity is primarily an on-site training activity. As such, inconsistencies in an inspector's performance are identified and corrected on-site. In addition to the value of the training, this approach ensures that only quality inspection data is accepted.

The CQA tool is designed to document the QA inspector's observations in the field and provide parameters within which an inspector must perform. Inspections that are being conducted outside of this standard may be stopped. A new inspection may be re-ordered at the discretion of the QA inspector. Sub-standard performance and required corrective actions are reported immediately to the Government Technical Representative (GTR) and contractor.

The CQA data collected during the review is provided as supporting documentation. This data will also be used to evaluate an inspector's performance over time, and will be reviewed in aggregate for program evaluation (training, protocol, etc.) purposes.

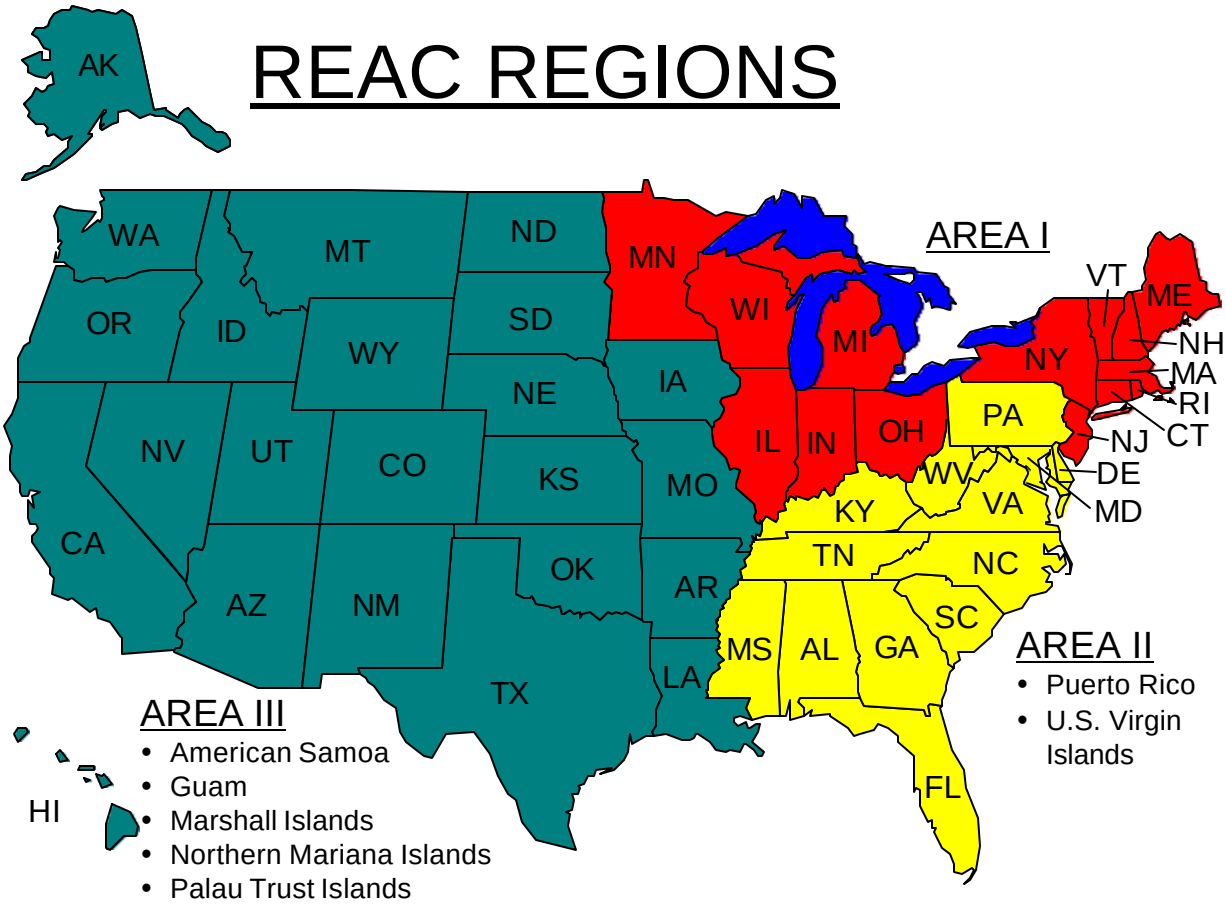
Independent Quality Assurance (IQA) Review Tool

The independent quality assurance (IQA) review tool is a modified version of the inspection software that enables a QA reviewer to conduct an independent inspection of a previously inspected property. The tool enables REAC to collect a comparative set of inspection data that will be used to quantitatively evaluate the accuracy of an inspection. This information will be used to determine the validity of an inspection or to evaluate an inspector's ability to properly conduct an inspection according to protocol. In aggregate, the data provides REAC with the means to conduct analyses of the accuracy and replicability of the inspection protocol.

Appendix 3 – List of Appended Units/Buildings from Phase I

Property	No. of Bldgs. Deleted	No. of Units Deleted	No. of Bldgs. Appended	No. of Units Appended
Phase1B	0	0	0	1
Phase1D	2	0	0	3
Phase1G	0	0	0	1
Phase1J	0	0	0	2
Phase1K	0	0	0	3
Phase1L	0	0	0	10
Phase1M	0	0	0	3
Phase1N	0	0	0	3
Phase1P	0	0	0	2
Phase1Q	0	0	0	1
Phase1S	0	0	0	3
Phase1T	0	0	2	3
Phase1V	0	0	0	1
Phase1X	0	0	0	2
Phase1AA	0	0	0	1
Phase1CC	0	0	0	4
Phase1DD	1	0	0	3
Phase1FF	0	0	0	1
Phase1HH	0	0	0	1
Phase1JJ	0	0	0	1
Phase1QQ	0	0	0	10
Phase1RR	0	0	0	10
Phase1SS	0	0	0	5
Phase1TT	1	0	0	4
Phase1UU	0	0	0	6
Phase1VV	0	0	0	2
Phase1WW	0	0	0	3
Phase1XX	0	0	0	2
Phase1YY	0	0	1	3
Phase1CCC	0	0	0	2
Phase1DDD	0	0	0	2
Phase1EEE	0	0	0	1
Phase1GGG	0	0	0	3
Phase1HHH	0	0	0	1

Appendix 4 – REAC Regional Breakdown



Appendix 5 - Sampling of Phase II Properties in the Validation Study

Limitations and Assumptions

REAC had inspectors conduct 56 inspections for the study in the time allotted. The number of inspections would have been reduced if inspectors had to devote extra days to travel. Accordingly, REAC adopted a two-stage sample design for the study. The study had to be conducted in the specified time frame and could not include properties that had recently been inspected. Thus, we were limited to the 3,500 public housing properties inspected approximately one year ago in public housing authorities with a fiscal year end date of 12/31/2000. Finally, because PHAs could refuse to cooperate with the study, REAC's options for replacing these properties were limited. More will be said about this issue later in the report.

The study makes the following assumptions. First, it is assumed that public housing properties with a fiscal year end date of 12/31 are representative of other housing properties in PHAs with other fiscal year end dates. Second it is assumed that, within the three contract regions used by REAC to roughly divide the totality of inspections into equal geographic regions, the degree of variation between inspectors is independent of geography In other words, a sample of housing properties in two or three states in a contract region can represent all properties in the contract region. Finally, it is assumed that the most salient factor in determining inter-inspector variation is the effort required for an inspection. That is, there will likely be less inter-inspector variation in simple inspections than in longer more complex inspections.

The Sampling Population

As stated earlier, the population of housing properties from which a sample could be drawn was the set of 3,500 properties that were owned by PHAs with a fiscal year end date of 12/31/2000, and what had been inspected in the previous year. These properties were grouped by state for the first stage of sampling.

The Selection of States

Originally, nine states were selected to be in the validation study sample. To ensure a representative sample of states, three states were chosen at random from each contract region. Each state had a probability of selection (State Probability) computed as:

$$\text{State Probability} = \text{MIN}\left(1 , 3 * \frac{\text{State Properties}}{\text{Region Properties}}\right).$$

Here, the State Properties variable is the number of population properties that are in the state. Likewise, the Region Properties variable is the number of population properties that are in the contract region. Table 1 shows these values for each state that had population properties.

After calculation of each state's probability of selection, states were randomly ordered within contract region. Then, a random start was established for each contract region. Finally, a systematic sample of three states was selected from each contract region. These states are as follows:

Region 1—Illinois, New York, and Pennsylvania,
Region 2—Alabama, South Carolina, and Tennessee, and
Region 3—California, Missouri, and Washington.

Selection of Properties Within States

After a sample of states was selected, properties within each state were stratified by the number of required sub-areas to be inspected for a property. These sub-areas were the site, each inspected building exterior, each inspected building systems, common areas in each inspected building, and each inspected dwelling unit. For each property, this value was calculated as:

$$\text{Inspected Sub-Areas} = 1 + (3 * \text{Inspected Buildings}) + \text{Inspected Dwelling Units}.$$

Here, inspected buildings and inspected dwelling units refer to the number of buildings and dwelling units that were inspected the last time an inspection was conducted on the property. The above calculation was used as a proxy measure of the effort required for the inspection. Four strata were created in each state. Table 2 gives the boundaries and the number of properties in each stratum.

Once strata were created, properties were sampled using simple random sampling without replacement. Two properties were selected from each stratum into the sample. An additional sample of four properties from each stratum was selected to be the sample of alternate properties.

Sampling probabilities and weights

The probability of selecting a property in the validation study is the product of the probability of selecting a state in the first stage of sampling and the probability of selecting the property in the second stage of sampling given the first stage selection of the state. Thus, a property's probability of selection, Property Probability, is:

$$\text{Property Probability} = \text{State Probability} * \text{MIN}\left(1 , \frac{2}{\text{Stratum Properties}}\right).$$

Here, the Stratum Properties variable is the number of population properties in a property stratum within a state. The Property Weight is the reciprocal of, or one over, the Property Probability. These weights are equal within strata; they are given with other stratum level information in Table 2.

Subsequent Sample Reduction

After the sample was selected, it was determined that there were only enough resources to conduct the study in seven, not nine, states. To decide which seven states would be retained, the average property weight ("Average Weight" below) was computed for each state. This value is proportional to the number of properties represented by the sampled properties in a state. The Original Retention Probability was computed as:

$$\text{Original Retention Probability} = \text{MIN}\left(1, 7 * \frac{\text{Average Weight}}{\text{Sum(Average Weight)}}\right),$$

where summation is over all states.

For the group 1 states, the Original Retention Probability equaled one because the second term on the right was greater than one. So that the reduced sample would have seven states, we computed the Final Retention Probability as:

$$\text{Final Retention Probability} = \begin{cases} 1, \text{ (if state is in contract group 1), and} \\ \text{MIN}\left(1 \text{ , } 4 * \frac{\text{Average Weight}}{\text{Sum(Average Weight)}}\right), \text{ otherwise.} \end{cases}$$

Here, summation is over the Average Weights in states that were not in contract region I. The Final Retention Probability for states in contract region 2 was about 0.69; the Final Retention Probability of states in contract region 3 was about 0.64.

Once retention probabilities were computed, states were randomly ordered and a systematic sample of states was selected. The reduced state sample is:

Region 1—Illinois, New York, and Pennsylvania,
Region 2—Alabama and South Carolina, and
Region 3—Missouri and Washington.

Thus, California and Tennessee were dropped from the sample of states.

Property weight adjustment

The sample reduction required a modification of the sample probabilities and the probability weights of the remaining properties. The Final Property Probability is computed as:

Final Property Probability = Property Probability * Final Retention Probability.

The Final Property Weight is the reciprocal of the Final Property Probability. Again, these probabilities and weights are constant within strata. Table 3 gives the Final Property Weight for each stratum.

Adjustment for Refusal to Cooperate

Because housing authorities could refuse to participate in the study, twice as many alternates as sample properties were drawn. However, the refusal of the largest housing authority in New York state to cooperate removed all sample and almost all alternate properties in New York state from consideration. In response, the first alternate in each of the four strata in Illinois was chosen to replace four New York sampled properties and the first alternate in each of the four strata in Pennsylvania was chosen to replace the other four New York sample properties. These alternates were given the New York sampling weights for their respective strata.

Representation of the Population

Table 4 gives a comparison of the weighted average of sampled projects with the average of population properties with regard to several characteristics. For each statistic, Table 4 gives three columns. The first column is for the population as a whole. The second column gives statistics for the sample of properties before the New York refusal; the last column gives statistics for the adjusted sample once New York units were replaced. Since only two properties are drawn from each stratum, standard errors of statistics can be computed as:

$$\text{Standard error} = \text{sqrt}\left(\text{sum(Stratum Weight)} * (\text{max(statistic)} - \text{min(statistic)})^2 / 2\right)$$

Here, the Stratum Weight is the number of properties in the stratum divided by the state's probability of being sampled; summation is over all strata.

For most statistics the original sample value is within two standard deviations of the population values. However, dropping the New York sample and replacing it with sample from Pennsylvania and Illinois seems to make the average score higher and the average property size smaller than that of the population as a whole. On the other hand, with New York included the average property size is larger than the population as a whole. Building Type for the sample without New York is closer to the population distribution than with New York. Overall, the final sample appears to be sufficiently representative of the population to yield statistically valid data.

Table 1
Sample Probabilities for States

State Code	Contract Region	State Properties	Region Properties	State Probability
AL	2	178	1006	.53082
AR	3	42	940	.13404
CA	3	195	940	.62234
CO	3	114	940	.36383
CT	1	46	1554	.08880
DE	2	8	1006	.02386
FL	2	70	1006	.20875
GA	2	180	1006	.53678
IA	3	21	940	.06702
ID	3	7	940	.02234
IL	1	317	1554	.61197
IN	1	59	1554	.11390
KS	3	65	940	.20745
KY	2	75	1006	.22366
LA	3	48	940	.15319
MA	1	50	1554	.09653
MD	2	13	1006	.03877
ME	1	11	1554	.02124
MI	1	61	1554	.11776
MN	1	57	1554	.11004
MO	3	84	940	.26809
MS	2	58	1006	.17296
NC	2	95	1006	.28330
ND	3	31	940	.09894
ND	3	31	940	.09894
NE	3	44	940	.14043
NE	3	44	940	.14043
NH	1	17	1554	.03282
NH	1	17	1554	.03282
NJ	1	67	1554	.12934
NJ	1	67	1554	.12934
NY	1	363	1554	.70077
NY	1	363	1554	.70077
OH	1	164	1554	.31660
OH	1	164	1554	.31660
OK	3	64	940	.20426
OK	3	64	940	.20426
OR	3	23	940	.07340
OR	3	23	940	.07340
PA	1	205	1554	.39575
PA	1	205	1554	.39575
RI	1	33	1554	.06371
RI	1	33	1554	.06371
SC	2	95	1006	.28330
SC	2	95	1006	.28330
SD	3	10	940	.03191

TN	2	135	1006	.40258
TX	3	162	940	.51702
UT	3	1	940	.00319
VA	2	45	1006	.13419
VQ	2	28	1006	.08350
WA	3	29	940	.09255
WI	1	104	1554	.20077
WV	2	26	1006	.07753

Table 2
Information About Strata Within States

State Code	stratum	Lower Boundary	Upper Boundary	Stratum Properties	Property Probability	Property Weight
AL	1	6	41	45	.02359	42.39
AL	2	42	59	44	.02413	41.45
AL	3	60	79	45	.02359	42.39
AL	4	80	121	44	.02413	41.45
CA	1	5	18	47	.02648	37.76
CA	2	19	42	50	.02489	40.17
CA	3	43	73	52	.02394	41.78
CA	4	74	146	46	.02706	36.96
IL	1	9	27	83	.01475	67.81
IL	2	28	41	76	.01610	62.09
IL	3	43	61	79	.01549	64.55
IL	4	62	111	79	.01549	64.55
MO	1	18	40	21	.02553	39.17
MO	2	41	57	21	.02553	39.17
MO	3	58	75	21	.02553	39.17
MO	4	77	110	21	.02553	39.17
NY	1	6	28	88	.01593	62.79
NY	2	29	38	92	.01523	65.64
NY	3	39	59	93	.01507	66.36
NY	4	60	115	90	.01557	64.21
PA	1	5	24	56	.01413	70.75
PA	2	25	32	47	.01684	59.38
PA	3	34	57	50	.01583	63.17
PA	4	60	111	52	.01522	65.70
SC	1	11	28	20	.02833	35.30
SC	1	11	28	20	.02833	35.30
SC	2	29	43	27	.02099	47.65
SC	2	29	43	27	.02099	47.65
SC	3	44	64	24	.02361	42.36
SC	3	44	64	24	.02361	42.36
SC	4	65	112	24	.02361	42.36
SC	4	65	112	24	.02361	42.36
TN	1	6	47	34	.02368	42.23
TN	1	6	47	34	.02368	42.23
TN	2	50	72	34	.02368	42.23
TN	2	50	72	34	.02368	42.23
TN	3	73	81	31	.02597	38.50
TN	3	73	81	31	.02597	38.50
TN	4	83	128	36	.02237	44.71
TN	4	83	128	36	.02237	44.71
WA	1	18	24	7	.02644	37.82
WA	1	18	24	7	.02644	37.82
WA	2	26	49	8	.02314	43.22
WA	2	26	49	8	.02314	43.22
WA	3	50	69	6	.03085	32.41
WA	3	50	69	6	.03085	32.41
WA	4	71	88	8	.02314	43.22

Table 3
Property Weights After Reduction in State Sample Size

State Code	Stratum	Property Probability	Retention Probability	Final Property Probability	Final Property Weight
AL	1	.02359	.68928	.01626	61.50
AL	2	.02413	.68928	.01663	60.13
AL	3	.02359	.68928	.01626	61.50
AL	4	.02413	.68928	.01663	60.13
IL	1	.01475	1.00000	.01475	67.81
IL	2	.01610	1.00000	.01610	62.09
IL	3	.01549	1.00000	.01549	64.55
IL	4	.01549	1.00000	.01549	64.55
MO	1	.02553	.64406	.01644	60.81
MO	2	.02553	.64406	.01644	60.81
MO	3	.02553	.64406	.01644	60.81
MO	4	.02553	.64406	.01644	60.81
NY	1	.01593	1.00000	.01593	62.79
NY	2	.01523	1.00000	.01523	65.64
NY	3	.01507	1.00000	.01507	66.36
NY	4	.01557	1.00000	.01557	64.21
PA	1	.01413	1.00000	.01413	70.75
PA	2	.01684	1.00000	.01684	59.38
PA	3	.01583	1.00000	.01583	63.17
PA	4	.01522	1.00000	.01522	65.70
SC	1	.02833	.68928	.01953	51.21
SC	2	.02099	.68928	.01446	69.13
SC	3	.02361	.68928	.01627	61.45
SC	4	.02361	.68928	.01627	61.45
SC	4	.02361	.68928	.01627	61.45
WA	1	.02644	.64406	.01703	58.72
WA	1	.02644	.64406	.01703	58.72
WA	2	.02314	.64406	.01490	67.10
WA	2	.02314	.64406	.01490	67.10
WA	3	.03085	.64406	.01987	50.33
WA	3	.03085	.64406	.01987	50.33
WA	4	.02314	.64406	.01490	67.10
WA	4	.02314	.64406	.01490	67.10

Table 4
Comparison of the Quality Validation Sample
to the Property Population

Statistic	Population	Unmodified With NY005	Sample without NY005
Average			
Score (Standard error)	70.14	73.12 (1.96)	77.39 (1.86)
#buildings (Standard error)	17.21	13.96 (0.91)	14.22 (0.92)
#Units (Standard error)	120.46	146.22 (26.06)	76.75 (20.82)
#Inspectable areas (Standard error)	51.57	48.51 (0.97)	47.38 (0.97)
Standard Error	1.79	1.69	1.58
Score Distribution			
% < 31	3.3	7.5	1.8
% 31 to 59	22.1	10.9	7.2
% 60 to 89	61.1	62.4	69.9
% >= 90	13.5	19.2	21.1
Size Distribution			
% < 20 units	15.6	15.5	17.3
% >=20 & < 50 units	31.3	35.6	41.3
% >= 50 & < 100 units	22.9	21.9	25.6
% >= 100 units	30.3	27.0	15.9
Building type distribution			
Single Family	20.8	20.9	20.9
Duplex	36.4	39.7	41.4
Row/town house	21.2	15.4	17.3
Low rise/gardeb	13.1	10.6	13.0
Mid/high rise	4.8	10.2	3.8
Common building	3.7	3.2	3.4

Appendix 6 – Item Level Concurrence for each inspection

Inspectable Item Concurrence

Properties	No. of Inspectable Items	No. of Agreed Inspectable Items in Inspections 1 & 2	% of Agreed Inspectable Items in Inspections 1 & 2	Properties	No. of Inspectable Items	No. of Agreed Inspectable Items in Inspections 1 & 2	% of Agreed Inspectable Items in Inspections 1 & 2
Phase1A	418	394	94.3%	Phase2A	1137	1069	94.0%
Phase1B	384	319	83.1%	Phase2B	316	299	94.6%
Phase1C	673	575	85.4%	Phase2C	1106	1024	92.6%
Phase1D	367	336	91.6%	Phase2D	656	619	94.4%
Phase1E	146	124	84.9%	Phase2E	830	755	91.0%
Phase1F	623	557	89.4%	Phase2F	555	522	94.1%
Phase1G	759	655	86.3%	Phase2G	913	779	85.3%
Phase1H	265	233	87.9%	Phase2H	146	138	94.5%
Phase1J	197	181	91.9%	Phase2J	753	692	91.9%
Phase1K	826	697	84.4%	Phase2K	556	464	83.5%
Phase1L	265	222	83.8%	Phase2L	810	795	98.1%
Phase1M	1030	903	87.7%	Phase2M	758	689	90.9%
Phase1N	1151	1006	87.4%	Phase2N	367	349	95.1%
Phase1P	403	362	89.8%	Phase2P	248	224	90.3%
Phase1Q	367	323	88.0%	Phase2Q	198	185	93.4%
Phase1R	1047	911	87.0%	Phase2R	453	402	88.7%
Phase1S	860	746	86.7%	Phase2S	452	403	89.2%
Phase1T	367	336	91.6%	Phase2T	605	541	89.4%
Phase1U	1134	1002	88.4%	Phase2U	809	771	95.3%
Phase1V	197	170	86.3%	Phase2V	963	875	90.9%
Phase1W	197	172	87.3%	Phase2W	419	378	90.2%
Phase1X	1119	987	88.2%	Phase2X	758	691	91.2%
Phase1Y	1118	968	86.6%	Phase2Y	214	183	85.5%
Phase1Z	983	832	84.6%	Phase2Z	930	847	91.1%
Phase1AA	1035	924	89.3%	Phase2AA	675	598	88.6%
Phase1BB	623	482	77.4%	Phase2BB	1370	1154	84.2%
Phase1CC	861	710	82.5%	Phase2CC	932	820	88.0%
Phase1DD	828	721	87.1%	Phase2DD	639	564	88.3%
Phase1EE	1031	847	82.2%	Phase2EE	384	334	87.0%
Phase1FF	1360	1127	82.9%	Phase2FF	420	386	91.9%
Phase1GG	1084	923	85.1%	Phase2GG	367	323	88.0%
Phase1HH	385	327	84.9%	Phase2HH	436	398	91.3%
Phase1JJ	1081	929	85.9%	Phase2JJ	504	460	91.3%
Phase1KK	537	437	81.4%	Phase2KK	758	645	85.1%
Phase1LL	1203	910	75.6%	Phase2LL	1032	972	94.2%
Phase1MM	826	693	83.9%	Phase2MM	249	221	88.8%
Phase1NN	1030	804	78.1%	Phase2NN	384	321	83.6%
Phase1PP	1030	846	82.1%	Phase2PP	435	389	89.4%
Phase1QQ	1185	922	77.8%	Phase2QQ	690	628	91.0%
Phase1RR	810	619	76.4%	Phase2RR	897	775	86.4%
Phase1SS	1271	1011	79.5%	Phase2SS	265	215	81.1%
Phase1TT	609	453	74.4%	Phase2TT	265	234	88.3%
Phase1UU	1270	973	76.6%	Phase2UU	419	379	90.5%
Phase1VV	1237	930	75.2%	Phase2VV	725	641	88.4%
Phase1WW	384	364	94.8%	Phase2WW	623	569	91.3%
Phase1XX	385	364	94.5%	Phase2XX	1083	938	86.6%
Phase1YY	878	742	84.5%	Phase2YY	507	411	81.1%
Phase1ZZ	775	670	86.5%	Phase2ZZ	1117	993	88.9%
Phase1AAA	503	471	93.6%	Phase2AAA	316	287	90.8%
Phase1BBB	1013	918	90.6%	Phase2BBB	299	274	91.6%
Phase1CCC	1081	917	84.8%	Phase2CCC	589	537	91.2%
Phase1DDD	826	708	85.7%	Phase2DDD	521	441	84.6%
Phase1EEE	929	848	91.3%	Phase2EEE	674	592	87.8%
Phase1FFF	605	521	86.1%	Phase2FFF	812	734	90.4%
Phase1GGG	673	608	90.3%	Phase2GGG	895	795	88.8%
Phase1HHH	915	776	84.8%	Phase2HHH	1099	938	85.4%

Appendix 7 - Defect Score Differences

Defect Score Differences		
		Overall Average Property Point Differences (Phase I and II)
Site		
Fencing and Gates	Damaged/Falling/Leaning	1.1
Fencing and Gates	Holes	0.5
Fencing and Gates	Missing Sections	0.4
Grounds	Erosion/Rutting Areas	2.3
Grounds	Overgrown/Penetrating Vegetation	1.5
Grounds	Ponding/Site Drainage	0.7
Mailboxes/Project Signs	Mailbox Missing/Damaged	< 0.05
Mailboxes/Project Signs	Signs Damaged	< 0.05
Market Appeal	Graffiti	1.0
Market Appeal	Litter	0.5
Parking Lots/Driveways/Roads	Ponding	< 0.05
Parking Lots/Driveways/Roads	Cracks	0.3
Parking Lots/Driveways/Roads	Potholes/Loose Material	0.2
Parking Lots/Driveways/Roads	Settlement/Heaving	0.2
Play Areas and Equipment	Damaged/Broken Equipment	0.3
Play Areas and Equipment	Deteriorated Play Area Surface	0.1
Refuse Disposal	Broken/Damaged Enclosure-Inadequate Outside Storag	0.2
Retaining Walls	Damaged/Falling/Leaning	0.5
Storm Drainage	Damaged/Obstructed	0.6
Walkways/Steps	Broken/Missing Hand Railing	1.3
Walkways/Steps	Cracks/Settlement/Heaving	0.6
Walkways/Steps	Spalling	0.2
BldgExt		
Doors	Damaged Frames/Threshold/Lintels/Trim	< 0.05
Doors	Missing Door	< 0.05
Doors	Damaged Surface (Holes/Paint/Rusting/Glass)	0.7
Doors	Deteriorated/Missing Caulking/Seals	0.5
Doors	Damaged Hardware/Locks	0.2
Doors	Damaged/Missing Screen/Storm/Security Door	0.1
Fire Escapes	Blocked Egress/Ladders	0.3
Foundations	Cracks/Gaps	0.7
Foundations	Spalling/Exposed Rebar	0.1
Lighting	Broken Fixtures/Bulbs	< 0.05
Roofs	Missing/Damaged Components from Downspout/Gutter	0.5
Roofs	Damaged Soffits/Fascia	0.3
Roofs	Missing/Damaged Shingles	0.1
Roofs	Ponding	0.1
Roofs	Damaged/Torn Membrane/Missing Ballast	0.1
Roofs	Damaged Vents	0.1

Walls	Damaged Chimneys	< 0.05
Walls	Missing Pieces/Holes/Spalling	1.4
Walls	Cracks/Gaps	1.2
Walls	Stained/Peeling/Needs Paint	0.3
Walls	Missing/Damaged Caulking/Mortar	0.2
Windows	Missing/Deteriorated Caulking/Glazing Compound	0.4
Windows	Broken/Missing/Cracked Panes	0.3
Windows	Security Bars Prevent Egress	0.2
Windows	Damaged Sills/Frames/Lintels/Trim	0.2
Windows	Damaged/Missing Screens	0.1
Windows	Peeling/Needs Paint	0.1
BldgSys		
Domestic Water	Misaligned Chimney/Ventilation System	< 0.05
Domestic Water	Leaking Central Water Supply	0.6
Domestic Water	Missing Pressure Relief Valve	0.1
Domestic Water	Water Supply Inoperable	0.1
Electrical System	Blocked Access/Improper Storage	< 0.05
Electrical System	Burnt Breakers	< 0.05
Electrical System	Missing Covers	0.3
Electrical System	Missing Breakers/Fuses	0.2
Elevators	Not Operable	0.1
Emergency Power	Auxiliary Lighting Inoperable	< 0.05
Emergency Power	Run-Up Records/Documentation Not Available	< 0.05
Exhaust System	Roof Exhaust Fans Inoperable	0.4
Fire Protection	Missing/Damaged/Expired Extinguishers	1.4
HVAC	Boiler/Pump Leaks	< 0.05
HVAC	Misaligned Chimney/Ventilation System	< 0.05
Sanitary System	Missing Drain/Cleanout/Manhole Covers	0.4
Sanitary System	Broken/Leaking/Clogged Pipes or Drains	0.1
CA		
Basement/Garage/Carport	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Basement/Garage/Carport	Ceiling - Peeling/Needs Paint	< 0.05
Basement/Garage/Carport	Doors - Damaged Frames/Threshold/Lintels/Trim	< 0.05
Basement/Garage/Carport	Doors - Damaged Hardware/Locks	< 0.05
Basement/Garage/Carport	Doors - Damaged Surface - Holes/Paint/Rusting/Glas	< 0.05
Basement/Garage/Carport	Doors - Missing Door	< 0.05
Basement/Garage/Carport	Electrical - Frayed Wiring	< 0.05
Basement/Garage/Carport	Electrical - Missing Covers	< 0.05
Basement/Garage/Carport	Floors - Peeling/Needs Paint	< 0.05
Basement/Garage/Carport	Lighting - Missing/Damaged/Inoperable Fixture	< 0.05
Basement/Garage/Carport	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Basement/Garage/Carport	Walls - Damaged	< 0.05
Basement/Garage/Carport	Walls - Peeling/Needs Paint	< 0.05
Basement/Garage/Carport	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Basement/Garage/Carport	Windows - Cracked/Broken/Missing Panes	< 0.05
Basement/Garage/Carport	Smoke Detector - Missing/Inoperable	0.1
Closet/Utility/Mechanical	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Closet/Utility/Mechanical	Ceiling - Peeling/Needs Paint	< 0.05
Closet/Utility/Mechanical	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Closet/Utility/Mechanical	Doors - Damaged Frames/Threshold/Lintels/Trim	< 0.05

Closet/Utility/Mechanical	Doors - Damaged Hardware/Locks	< 0.05
Closet/Utility/Mechanical	Doors - Damaged Surface - Holes/Paint/Rusting/Glas	< 0.05
Closet/Utility/Mechanical	Doors - Missing Door	< 0.05
Closet/Utility/Mechanical	Electrical - Blocked Access to Electrical Panel	< 0.05
Closet/Utility/Mechanical	Floors - Floor Covering Damage	< 0.05
Closet/Utility/Mechanical	Floors - Missing Flooring/Tiles	< 0.05
Closet/Utility/Mechanical	Floors - Water Stains/Water Damage/Mold/Mildew	< 0.05
Closet/Utility/Mechanical	Lighting - Missing/Damaged/Inoperable Fixture	< 0.05
Closet/Utility/Mechanical	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Closet/Utility/Mechanical	Smoke Detector - Missing/Inoperable	< 0.05
Closet/Utility/Mechanical	Walls - Damaged	< 0.05
Closet/Utility/Mechanical	Walls - Damaged/Deteriorated Trim	< 0.05
Closet/Utility/Mechanical	Walls - Peeling/Needs Paint	< 0.05
Closet/Utility/Mechanical	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Closet/Utility/Mechanical	Windows - Cracked/Broken/Missing Panes	< 0.05
Closet/Utility/Mechanical	Electrical - Missing Breakers	0.2
Closet/Utility/Mechanical	Electrical - Missing Covers	0.1
Community Room	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Community Room	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Community Room	Doors - Damaged Frames/Threshold/Lintels/Trim	< 0.05
Community Room	Doors - Damaged Hardware/Locks	< 0.05
Community Room	Electrical - Missing Breakers	< 0.05
Community Room	Floors - Missing Flooring/Tiles	< 0.05
Community Room	HVAC - Inoperable	< 0.05
Community Room	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Community Room	Smoke Detector - Missing/Inoperable	< 0.05
Community Room	Walls - Damaged	< 0.05
Community Room	Windows - Cracked/Broken/Missing Panes	< 0.05
Community Room	Windows - Inoperable/Not Lockable	< 0.05
Community Room	Windows - Security Bars Prevent Egress	< 0.05
Community Room	Doors - Deteriorated/Missing Seals(Entry Only)	0.1
Day Care	Doors - Damaged Hardware/Locks	< 0.05
Day Care	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Day Care	Windows - Security Bars Prevent Egress	< 0.05
Halls/Corridors/Stairs	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Halls/Corridors/Stairs	Doors - Damaged Surface - Holes/Paint/Rusting/Glas	< 0.05
Halls/Corridors/Stairs	Doors - Missing Door	< 0.05
Halls/Corridors/Stairs	Floors - Floor Covering Damage	< 0.05
Halls/Corridors/Stairs	Graffiti	< 0.05
Halls/Corridors/Stairs	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Halls/Corridors/Stairs	Smoke Detector - Missing/Inoperable	< 0.05
Halls/Corridors/Stairs	Stairs - Broken/Damaged/Missing Steps	< 0.05
Halls/Corridors/Stairs	Stairs - Broken/Missing Hand Railing	< 0.05
Halls/Corridors/Stairs	Walls - Peeling/Needs Paint	< 0.05
Halls/Corridors/Stairs	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Halls/Corridors/Stairs	Windows - Cracked/Broken/Missing Panes	< 0.05
Halls/Corridors/Stairs	Windows - Damaged Window Sill	< 0.05
Halls/Corridors/Stairs	Windows - Peeling/Needs Paint	< 0.05
Halls/Corridors/Stairs	Doors - Damaged Hardware/Locks	0.2
Halls/Corridors/Stairs	Electrical - Missing Covers	0.2
Halls/Corridors/Stairs	HVAC - Inoperable	0.2

Halls/Corridors/Stairs	Doors - Deteriorated/Missing Seals(Entry Only)	0.1
Halls/Corridors/Stairs	Windows - Inoperable/Not Lockable	0.1
Halls/Corridors/Stairs	Ceiling - Holes/Missing Tiles/Panels/Cracks	0.1
Halls/Corridors/Stairs	Walls - Damaged	0.1
Halls/Corridors/Stairs	Doors - Damaged Frames/Threshold/Lintels/Trim	0.1
Kitchen	Cabinets - Missing/Damaged	< 0.05
Kitchen	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Kitchen	Countertops - Missing/Damaged	< 0.05
Kitchen	Dishwasher/Garbage Disposal - Inoperable	< 0.05
Kitchen	Doors - Damaged Hardware/Locks	< 0.05
Kitchen	Doors - Missing Door	< 0.05
Kitchen	GFI - Inoperable	< 0.05
Kitchen	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Kitchen	Plumbing - Leaking Faucet/Pipes	< 0.05
Kitchen	Range Hood/Exhaust Fans - Excessive Grease/Inopera	< 0.05
Kitchen	Range/Stove - Missing/Damaged/Inoperable	< 0.05
Kitchen	Refrigerator - Damaged/Inoperable	< 0.05
Laundry Room	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Laundry Room	Ceiling - Peeling/Needs Paint	< 0.05
Laundry Room	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Laundry Room	Dryer Vent - Missing/Damaged/Inoperable	< 0.05
Laundry Room	Floors - Floor Covering Damage	< 0.05
Laundry Room	Floors - Missing Flooring/Tiles	< 0.05
Laundry Room	Floors - Peeling/Needs Paint	< 0.05
Laundry Room	HVAC - Inoperable	< 0.05
Laundry Room	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Laundry Room	Walls - Bulging/Buckling	< 0.05
Laundry Room	Walls - Damaged	< 0.05
Laundry Room	Walls - Peeling/Needs Paint	< 0.05
Laundry Room	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Laundry Room	Windows - Cracked/Broken/Missing Panes	< 0.05
Laundry Room	Windows - Missing/Deteriorated Caulking/Seals/Glaz	< 0.05
Laundry Room	Windows - Security Bars Prevent Egress	< 0.05
Laundry Room	Doors - Missing Door	0.1
Lobby	Ceiling - Peeling/Needs Paint	< 0.05
Lobby	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Lobby	Doors - Damaged Hardware/Locks	< 0.05
Lobby	Electrical - Missing Covers	< 0.05
Lobby	Walls - Damaged	< 0.05
Lobby	Walls - Peeling/Needs Paint	< 0.05
Lobby	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Office	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Office	Ceiling - Peeling/Needs Paint	< 0.05
Office	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Office	Doors - Damaged Hardware/Locks	< 0.05
Office	Doors - Damaged Surface - Holes/Paint/Rusting/Glas	< 0.05
Office	Doors - Missing Door	< 0.05
Office	Electrical - Missing Breakers	< 0.05
Office	Electrical - Missing Covers	< 0.05
Office	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Office	Smoke Detector - Missing/Inoperable	< 0.05

Office	Walls - Damaged	< 0.05
Office	Walls - Damaged/Deteriorated Trim	< 0.05
Office	Walls - Peeling/Needs Paint	< 0.05
Office	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Office	Windows - Cracked/Broken/Missing Panes	< 0.05
Office	Windows - Missing/Deteriorated Caulking/Seals/Glaz	< 0.05
Office	Windows - Security Bars Prevent Egress	< 0.05
Other Community Spaces	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Other Community Spaces	Ceiling - Peeling/Needs Paint	< 0.05
Other Community Spaces	Doors - Damaged Hardware/Locks	< 0.05
Other Community Spaces	Doors - Damaged Surface - Holes/Paint/Rusting/Glas	< 0.05
Other Community Spaces	Doors - Deteriorated/Missing Seals(Entry Only)	< 0.05
Other Community Spaces	Doors - Missing Door	< 0.05
Other Community Spaces	Electrical - Missing Breakers	< 0.05
Other Community Spaces	Electrical - Missing Covers	< 0.05
Other Community Spaces	HVAC - Inoperable	< 0.05
Other Community Spaces	Smoke Detector - Missing/Inoperable	< 0.05
Other Community Spaces	Walls - Damaged	< 0.05
Other Community Spaces	Walls - Peeling/Needs Paint	< 0.05
Other Community Spaces	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Other Community Spaces	Windows - Cracked/Broken/Missing Panes	< 0.05
Other Community Spaces	Windows - Inoperable/Not Lockable	< 0.05
Other Community Spaces	Windows - Missing/Deteriorated Caulking/Seals/Glaz	< 0.05
Other Community Spaces	Windows - Security Bars Prevent Egress	< 0.05
Patio/Porch/Balcony	Baluster/Side Railings Damaged	< 0.05
Patio/Porch/Balcony	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Patio/Porch/Balcony	Doors - Damaged Hardware/Locks	< 0.05
Patio/Porch/Balcony	Doors - Damaged/Missing Screen/Storm/Security Door	< 0.05
Patio/Porch/Balcony	Floors - Floor Covering Damage	< 0.05
Patio/Porch/Balcony	Floors - Rot/Deteriorated Subfloor	< 0.05
Patio/Porch/Balcony	Stairs - Broken/Damaged/Missing Steps	< 0.05
Patio/Porch/Balcony	Stairs - Broken/Missing Hand Railing	< 0.05
Patio/Porch/Balcony	Walls - Damaged/Deteriorated Trim	< 0.05
Patio/Porch/Balcony	Walls - Peeling/Needs Paint	< 0.05
Restrooms/Pool Structures	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Restrooms/Pool Structures	Ceiling - Peeling/Needs Paint	< 0.05
Restrooms/Pool Structures	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Restrooms/Pool Structures	Doors - Damaged Frames/Threshold/Lintels/Trim	< 0.05
Restrooms/Pool Structures	Doors - Damaged Surface - Holes/Paint/Rusting/Glas	< 0.05
Restrooms/Pool Structures	Floors - Floor Covering Damage	< 0.05
Restrooms/Pool Structures	Floors - Missing Flooring/Tiles	< 0.05
Restrooms/Pool Structures	GFI - Inoperable	< 0.05
Restrooms/Pool Structures	HVAC - General Rust/Corrosion	< 0.05
Restrooms/Pool Structures	Lavatory Sink - Damaged/Missing	< 0.05
Restrooms/Pool Structures	Lighting - Missing/Damaged/Inoperable Fixture	< 0.05
Restrooms/Pool Structures	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Restrooms/Pool Structures	Plumbing - Clogged Drains	< 0.05
Restrooms/Pool Structures	Plumbing - Leaking Faucet/Pipes	< 0.05
Restrooms/Pool Structures	Shower/Tub - Damaged/Missing	< 0.05
Restrooms/Pool Structures	Ventilation/Exhaust System - Inoperable	< 0.05
Restrooms/Pool Structures	Walls - Damaged	< 0.05

Restrooms/Pool Structures	Walls - Peeling/Needs Paint	< 0.05
Restrooms/Pool Structures	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Restrooms/Pool Structures	Windows - Cracked/Broken/Missing Panes	< 0.05
Restrooms/Pool Structures	Windows - Inoperable/Not Lockable	< 0.05
Restrooms/Pool Structures	Windows - Security Bars Prevent Egress	< 0.05
Restrooms/Pool Structures	Water Closet/Toilet - Damaged/Clogged/Missing	0.1
Storage	Ceiling - Holes/Missing Tiles/Panels/Cracks	< 0.05
Storage	Ceiling - Peeling/Needs Paint	< 0.05
Storage	Ceiling - Water Stains/Water Damage/Mold/Mildew	< 0.05
Storage	Doors - Damaged Hardware/Locks	< 0.05
Storage	Doors - Damaged Surface - Holes/Paint/Rusting/Glas	< 0.05
Storage	Doors - Missing Door	< 0.05
Storage	Electrical - Blocked Access to Electrical Panel	< 0.05
Storage	Electrical - Missing Breakers	< 0.05
Storage	Electrical - Missing Covers	< 0.05
Storage	Floors - Floor Covering Damage	< 0.05
Storage	Floors - Missing Flooring/Tiles	< 0.05
Storage	HVAC - Convection/Radiant Heat System Covers Missi	< 0.05
Storage	Lighting - Missing/Damaged/Inoperable Fixture	< 0.05
Storage	Outlets/Switches/Cover Plates - Missing/Broken	< 0.05
Storage	Smoke Detector - Missing/Inoperable	< 0.05
Storage	Walls - Damaged	< 0.05
Storage	Walls - Damaged/Deteriorated Trim	< 0.05
Storage	Walls - Peeling/Needs Paint	< 0.05
Storage	Walls - Water Stains/Water Damage/Mold/Mildew	< 0.05
Storage	Windows - Cracked/Broken/Missing Panes	< 0.05
Storage	Windows - Damaged Window Sill	< 0.05
Storage	Windows - Inoperable/Not Lockable	< 0.05
Storage	Windows - Security Bars Prevent Egress	< 0.05
Trash Collection Areas	Chutes - Damaged/Missing Components	0.1
DU		
Bathroom	Bathroom Cabinets - Damaged/Missing	< 0.05
Bathroom	Water Closet/Toilet - Damaged/Clogged/Missing	0.9
Bathroom	Shower/Tub - Damaged/Missing	0.9
Bathroom	Plumbing - Clogged Drains	0.7
Bathroom	Lavatory Sink - Damaged/Missing	0.6
Bathroom	Plumbing - Leaking Faucet/Pipes	0.6
Bathroom	Ventilation/Exhaust System - Inoperable	0.3
Call-for-Aid	Inoperable	< 0.05
Ceiling	Bulging/Buckling	< 0.05
Ceiling	Peeling/Needs Paint	< 0.05
Ceiling	Water Stains/Water Damage/Mold/Mildew	< 0.05
Ceiling	Holes/Missing Tiles/Panels	0.1
Doors	Damaged Hardware/Locks	1.1
Doors	Deteriorated/Missing Seals (Entry Only)	1.0
Doors	Damaged Surface - Holes/Paint/Rusting/Glass	0.7
Doors	Missing Door	0.2
Doors	Damaged Frames/Threshold/Lintels/Trim	0.1
Doors	Damaged/Missing Screen/Storm/Security Door	0.1
Electrical System	Burnt Breakers	< 0.05
Electrical System	GFI - Inoperable	2.6

Electrical System	Missing Breakers/Fuses	0.5
Electrical System	Blocked Access to Electrical Panel	0.2
Electrical System	Missing Covers	0.1
Floors	Bulging/Buckling	< 0.05
Floors	Missing Flooring Tiles	< 0.05
Floors	Peeling/Needs Paint	< 0.05
Floors	Rot/Deteriorated Subfloor	< 0.05
Floors	Water Stains/Water Damage/Mold/Mildew	< 0.05
Floors	Floor Covering Damage	0.1
Hot Water Heater	Leaking Valves/Tanks/Pipes	< 0.05
Hot Water Heater	Pressure Relief Valve Missing	0.6
Hot Water Heater	Misaligned Chimney/Ventilation System	0.2
Hot Water Heater	Rust/Corrosion	0.2
Hot Water Heater	Inoperable Unit/Components	0.2
HVAC System	Convection/Radiant Heat System Covers Missing/Dama	< 0.05
HVAC System	Noisy/Vibrating/Leaking	< 0.05
HVAC System	Rust/Corrosion	< 0.05
HVAC System	Inoperable	0.6
HVAC System	Misaligned Chimney/Ventilation System	0.1
Kitchen	Dishwasher/Garbage Disposal - Inoperable	< 0.05
Kitchen	Plumbing - Clogged Drains	< 0.05
Kitchen	Range/Stove - Missing/Damaged/Inoperable	2.5
Kitchen	Refrigerator - Missing/Damaged/Inoperable	1.3
Kitchen	Range Hood/Exhaust Fans - Excessive Grease/Inopera	0.3
Kitchen	Plumbing - Leaking Faucet/Pipes	0.3
Kitchen	Cabinets - Missing/Damaged	0.1
Kitchen	Sink - Damaged/Missing	0.1
Kitchen	Countertops - Missing/Damaged	0.1
Laundry Area (Room)	Dryer Vent - Missing/Damaged/Inoperable	0.1
Lighting	Missing/Inoperable Fixture	< 0.05
Outlets/Switches	Missing	< 0.05
Outlets/Switches	Missing/Broken Cover Plates	0.2
Patio/Porch/Balcony	Baluster/Side Railings Damaged	< 0.05
Smoke Detector	Missing/Inoperable	< 0.05
Stairs	Broken/Missing Hand Railing	< 0.05
Walls	Bulging/Buckling	< 0.05
Walls	Damaged/Deteriorated Trim	< 0.05
Walls	Water Stains/Water Damage/Mold/Mildew	< 0.05
Walls	Damaged	0.2
Walls	Peeling/Needs Paint	0.1
Windows	Damaged Window Sill	< 0.05
Windows	Peeling/Needs Paint	< 0.05
Windows	Missing/Deteriorated Caulking/Seals/Glazing Compou	0.4
Windows	Inoperable/Not Lockable	0.2
Windows	Security Bars Prevent Egress	0.1
Windows	Cracked/Broken/Missing Panes	0.1
HS		
Air Quality	Mold and/or Mildew Observed	0.1
Air Quality	Sewer Odor Detected	0.1
Electrical Hazards	Water Leaks on/near Electrical Equipment	< 0.05
Electrical Hazards	Exposed Wires/Open Panels	0.8

Emergency/Fire Exits	Missing Exit Signs	< 0.05
Emergency/Fire Exits	Emergency/Fire Exits Blocked/Unusable	2.2
Flammable Materials	Improperly Stored	0.3
Garbage and Debris	Indoors	< 0.05
Garbage and Debris	Outdoors	0.1
Hazards	Other	< 0.05
Hazards	Tripping	4.6
Hazards	Sharp Edges	0.3
Infestation	Insects	1.8
Infestation	Rats/Mice/Vermin	0.1